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# STUDIES IN PSYCHOLOGY

EDITED BY E.A.KIRKPATRICK

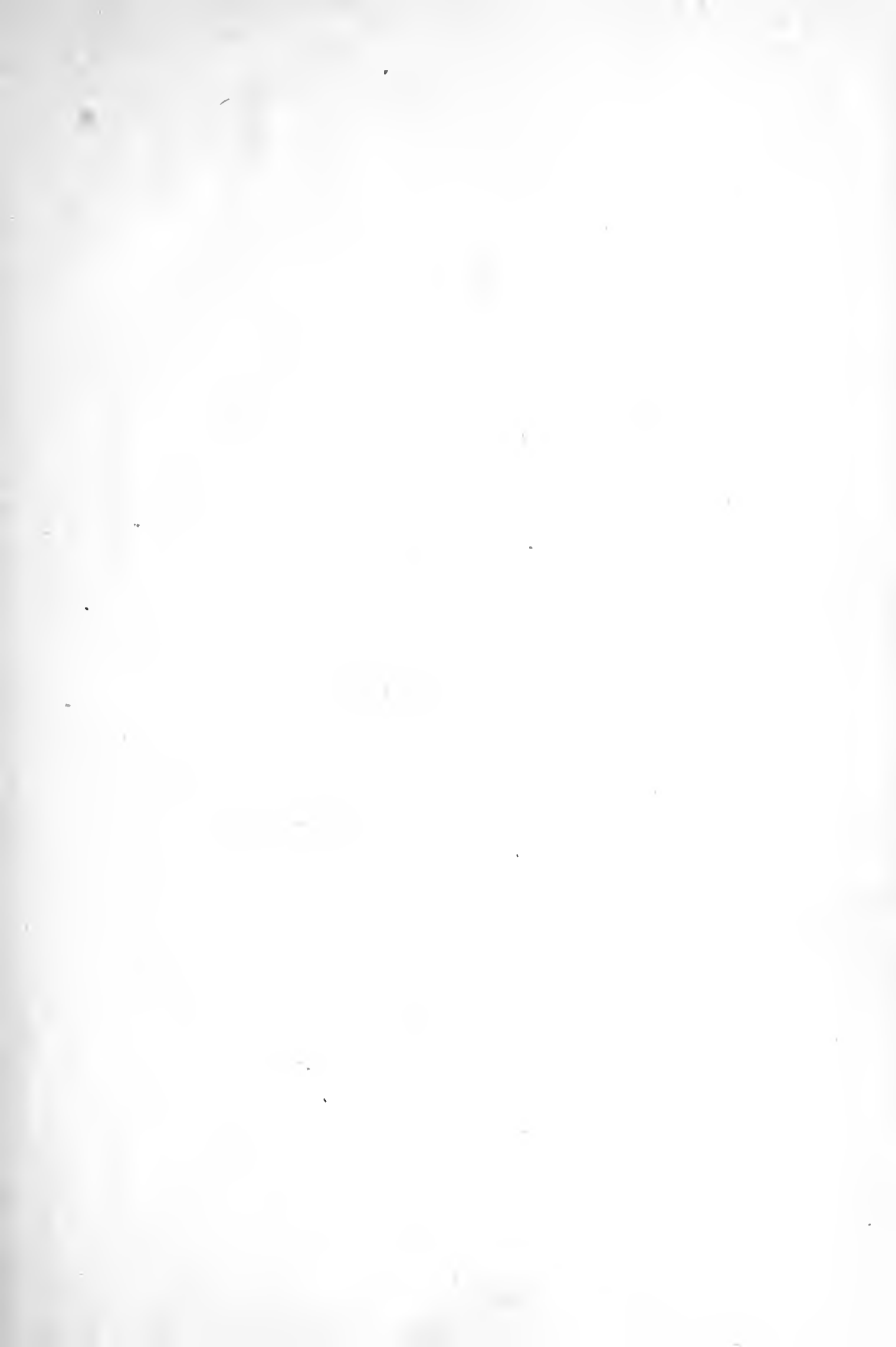


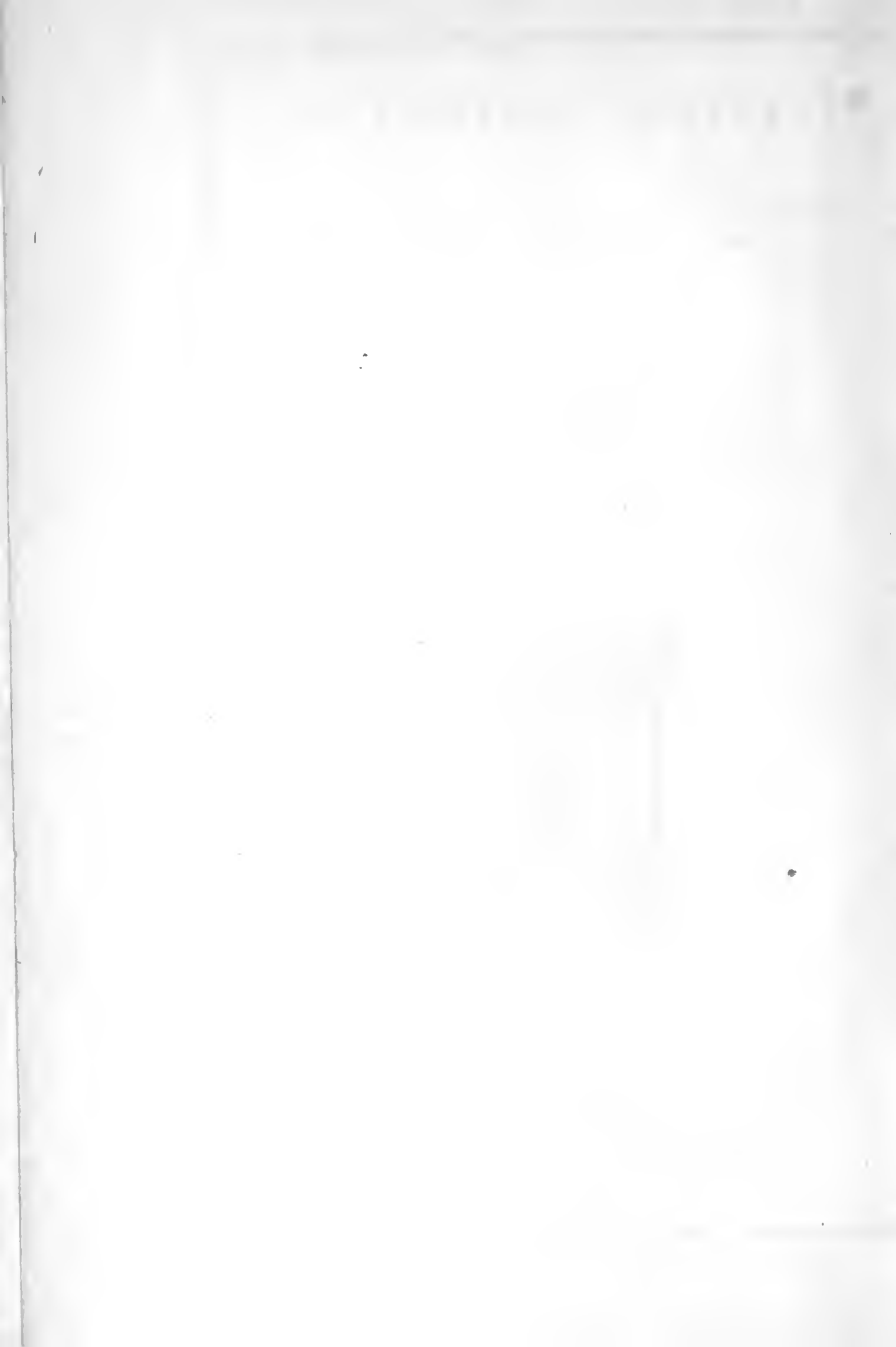
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# STUDIES IN PSYCHOLOGY

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BY STUDENT TEACHERS FOR TEACHERS  
IN TRAINING AND SERVICE

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DIRECTED AND EDITED BY

**E. A. KIRKPATRICK**

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BOSTON  
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## INTRODUCTION

The introduction to the first of these studies, which was made and printed in pamphlet form by the class of 1909 of the State Normal School at Fitchburg, Mass., gives a good idea of the way in which all were prepared.

“The following discussion of habit is the result of an experiment in teaching psychology in an inductive, expressive and coöperative way to three divisions of a class of beginning students in a normal school.

The general problem placed before the class at the beginning was stated as being “To find how habits may be most quickly and permanently formed and how they may be most easily and quickly changed.” It was suggested that all working together might perhaps prepare an article as good or better than any that had been prepared by one person. The writer suggested experiments and observations to be made and questioned statements that were formulated so as to make students describe more carefully and accurately their own facts and opinions. He encouraged discussion of disputed points, but left the students to determine for themselves the facts and conclusions.

The subject was divided into three general topics, first, nature of habit; second, facts and laws of habit formation and the results and relations of habits; third, habit breaking. All the students wrote out descriptions of habits they had observed in themselves and others. They also made attempts to break some habit of their own, keeping a record of progress, and later they tried to lead some one else to

break or form a habit, and to induce an individual child with whom they were working to modify some habit.

To determine more definitely the laws of habit formation all practiced an exercise arranged by Prof. Lough of New York University. It consisted of a test sheet containing ten lines of letters and a "key sheet" upon which were pairs of letters, the left hand numbers of which were arranged alphabetically. A blank sheet was placed under the first horizontal line of the test sheet and under each letter was written the letter found opposite the same letter on the key. The time for writing one line designated as a "trial" was recorded in seconds. The letters written were then folded under and the second line was used in a similar way. This was repeated for all the lines, the ten constituting the "test." One or more tests were taken each day and the results were averaged by committees, and this data, together with subjective observations, was discussed. Later several tests were made with a "key" in which the pairs of letters were differently arranged.

After the first general topic had been discussed in class each individual wrote upon it, then a committee was appointed to combine the good points of all the papers into one. This was read to the division and freely criticized, disputed points being decided, after discussion, by a vote. After the other two topics had been worked over in this manner each student wrote a complete paper on the subject, and a committee worked over the papers prepared by the three previous committees into a discussion of the whole subject of habit. This was also read to the class and criticized. At first it was suggested that the division preparing the best paper should have the results of its study printed, but later it was decided by the class to appoint a committee to combine the papers of the three divisions, which were



found to differ considerably in their observations, conclusions and arrangement of topics. The following is the result of their labors, revised to some extent by another committee.

About five weeks with four recitations per week were spent by the class upon this topic. At the close most of the class thought that they had produced something better than any one thing that they had read, or at least that it meant more to them. The present writer agrees that they got more out of the work than they could from studying and reading the writings of others. How much other students can get from the printed results of their work is a question to be decided later. Teachers of psychology will, perhaps, doubt whether so much time (about one-fourth that given to psychology the first year) should be spent upon one topic, important though it be. The experiment has, at any rate, been an interesting one, and it is hoped that this little pamphlet may prove a help and inspiration, not only to the members of the class publishing it, but to subsequent classes and perhaps also to students in other schools."

The method of preparing the other studies was much the same and succeeding classes found the pamphlets compiled by their predecessors of much interest and value.

The original pamphlets have been modified slightly in the interest of accuracy but the writer has substituted his own expressions for those of his students only when necessary. The reason for this is that psychology, even more than other subjects, is to many students little more than a collection of words of indefinite meaning unilluminated by reference to their own experiences, while the statement of psychological truths in the words of persons of approximately their own level of mental development is much more likely to relieve this unfortunate state of mind than the more technical lan-

guage of the professional psychologist. This fact has been impressed upon the writer and also upon other teachers of psychology who have placed these studies in the hands of their students.

Most of the truths ordinarily given in elementary psychologies with numerous applications and illustrations are embodied in these studies in a form that is *sure* to be understood. This does not, however, mean that these truths will be fully appreciated by students who merely read them. On the contrary their greatest value is gained only when students are stimulated by their reading to observe, experiment and express for themselves. The instructor in psychology or the leader of a reading circle should encourage this practice as much as possible. At the close of these studies will be found a number of suggestions to this end.

E. A. KIRKPATRICK

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# STUDIES IN PSYCHOLOGY

## I

### A STUDY OF HABIT

#### NATURE OF HABIT

EVERY individual has numerous habits, some of which are good, some bad. In the earliest stages of infancy a child begins to form habits and they continue to multiply throughout his life. Children's characters are moulded during their school life, and as all children enter upon their school career with both good and bad habits, it is necessary that teachers should know how best to deal with them.

How many times at a social gathering one has heard the remark, "I have been in the habit of going to bed at nine o'clock lately, and I am so sleepy that I can hardly keep my eyes open." What does this person mean by habit? *Habit is the acquired tendency of mind or body to do the same or similar things under the same or similar conditions, when the result produces satisfaction.*

It is through the study of this subject that our attention has been drawn to the following observations and illustrations of general truths.

The Normal students take their "Responsive Readings" with their singing books to chapel every morning. In the afternoon when going to music they often take both books instead of only the one which they need. By repeating this

act every morning they have formed the habit and do it unconsciously in the afternoon.

When one of the students, who lives at the dormitory during school year, was at home, she was accustomed to taking a short cut from the main street to reach her house. Shortly after arriving home one Friday, she was told that the way was closed to all traffic; but about two hours later as she was on her way home from the main street, she started to take the short cut, as had been her custom for years, and never thought of the way being closed until she was confronted by the sign, "No trespassing."

Another girl said, "Whenever I wash the dishes at night I can always tell by whom the dish-cloth has been last used, by the place in which I find it. One sister hangs it on the hot water faucet, another sister leaves it in a bunch on the shelf, another always hangs it up very neatly behind the stove, while I lay it on the shelf behind the stove."

The word habit comes from the Latin word *habeo*, meaning I have. Habit is an ever-present tendency to act, rather than the specific act itself. The act of repetition is not in itself the habit, for the habit is a continuous inner tendency revealed only when the proper associations cause the act. The case is similar to that of two towns with telegraphic communication. So long as the wire and instruments are in good condition, messages sent from one town will reach the other. The connection is constant even when not in use. If there is no use or repair for a long time the instruments may become rusty, or the wire broken; then the connection is at an end. In this illustration the connection is analogous to the habit, and the sending of the messages, to repetition.

Habit is *an acquired individual tendency*, as opposed to instinct, which is *an inherited tendency common to the race*. Habit often begins with a voluntary action and by repe-

tition becomes involuntary, while instinct is always involuntary when it first appears in the individual. Yawning when sleepy, the crying of a baby, and the desire to escape from danger are instincts; but writing badly, reading slowly, and eating rapidly are habits. Instincts may become habits if they are specialized in some way. Sleeping and eating are instincts, but sleeping at certain times and eating three meals a day are habits.

*There are three kinds of habits,—physical, mental and moral.* Walking rapidly is a physical habit; concentration of the mind is a mental habit; and truthfulness is a moral habit.

When a man is asked to mention some particular habit he will usually answer, smoking, or wearing a coat when it is cold, or wearing his hat in the office; in other words, some physical habit. This leads to a natural conclusion that more is known about physical habits and consequently the most interest centers there. Although the attention of people in general is called to physical habits only, nevertheless mental and moral habits are quite as important.

Under the subject of mental habits the following are good examples: One student reports that when adding mentally she sees the figures as on the face of a clock having ten figures. Another states that when counting mentally she sees the numbers as words, one, two, three, etc. The method reported by the majority of people is that of speaking the numbers mentally in rapid succession.

Illustrations of moral habits are honesty, truthfulness and orderliness.

*Learning and habit are very closely related and merge into each other.* Learning must precede and prepare the way in the formation of complex habits. To learn to crochet easily, the manner of holding the thread and every

separate motion must first be repeated many times with full attention. This stage is purely that of learning. After practise the attention may be withdrawn from the details and given to other things. Habit has then entered in and begun to make the process mechanical. In the growth of all habits, consciously formed, there are somewhat similar steps.

*Association is always the stimulus which starts the act or chain of acts involved in an habitual performance.* That is, the act is repeated because the associations at the time are like those which have formerly been present when the action was performed. For example, one girl has noticed that if her father mentions the name, "Littlefield," she thinks of one of his employees, but if her sister speaks the name she thinks of a minister whose surname is Littlefield. A young lady who is in the habit of going to school at twenty minutes of nine, when she sees the hands of the clock in that position, immediately thinks of starting to school.

#### FORMATION OF HABIT

When one thoroughly observes the many habits that are a part of himself and of others, the question very naturally arises,—By what means did these acts become habit? Physiologists tell us that every time an act is performed it is registered in the brain by a little pathway through the gray matter. At every repetition the same pathway is used and thus made deeper. When the situation that called for the first act recurs, the act which has now become easy, by continued repetitions, will very likely be performed again. After many repetitions the pathway in the brain may become so fixed that it is doubtful if it can ever be effaced. Finally, when the situation calling for the act recurs the impulse will travel this pathway without affecting consciousness. Such observations can be made only by experts, and this paper



will be confined to facts that may be discovered by the ordinary observer.

*Habits may be formed unconsciously*, and they are often of value as they relieve us of deciding each time what method shall be used in a simple act. They are often started at first by chance circumstances which happen to be repeated, and finally, become established. All the little nervous habits, such as swinging the feet and playing with a pencil, are formed in this way. One student reports, "I have a different position in each recitation room, which I unconsciously assume every time I recite. In the History room I sit facing the left, with my left arm thrown over the back of the chair. In the Psychology room I face toward the right, with my left knee over my right. In the English room I sit squarely facing the front, with my arms crossed. I have formed these habits because I must face the teacher. I did not notice that I assumed these positions until my attention was called to them by this study of habit."

*Regular repetition is an important factor in the formation of a habit.* If an interval is left between each two repetitions, the next time the act can be done much more easily and with better results. This is explained by the fact that whenever the muscles are used there is a tearing down process whereby the organic waste is given off, and afterward there is a building up process by which the muscle is put into a better condition than when previously used. By leaving an interval between the processes of tearing down, the muscles have a chance to be rebuilt properly, and a greater amount of work may be done the next time. This is shown by the athlete who, when he first begins practising, can lift only a small weight, but after continual practice, with a rest between times, he so develops his muscles that he can lift a much heavier object.

*The best arrangement of repetitions depends wholly upon what one is attempting.* One member of the class reported that in studying history she spent the three hours allotted to that subject, at one time, because she could obtain a more connected idea of the whole. On the other hand, in the case of writing in a copy book, she divided her time into thirty-minute periods. In the first instance, the longer the time, the better the work, while in the second instance the reverse was true; the shorter the period, the better the result.

*There are four important changes which take place during the formation of a habit, that is, in mode of doing, in speed, in accuracy, and in degree of consciousness.*

With each repetition of an act we change our method of procedure until we find the easiest way. In regard to the  $a = x$  test the following was reported:—"The first test, I was obliged to look on the key for each combination; by the time I had finished the second test I had associated many of the combinations with initials of people whom I knew. This shows that not only may habits be developed from instincts as a basis but also that previous memories or habits may help (or perhaps hinder) the formation of a new habit. During the first three trials I had a mental image of the key, that is, I could see in my mind the first row of letters and those opposite that I knew, but the rest were invisible. After the fourth test I had learned all the combinations and thought no more about the initials but sing-songed the letters as I wrote, and was able to tell when I wrote a wrong letter by the break in the rhythm."

It took fifty-six seconds to do the first trial of the first test, while the first trial of the tenth test took twenty-two. There was a difference of thirty-four seconds between the average trials of the first and fifth tests, while there was a difference of two between the average trials of the fifth and

tenth tests. This shows a much greater gain during the first half than during the last half of the tests, and if we had continued the tests longer we would soon have reached our speed limit. *Progress is greater at first.*

*Ease and accuracy are also results of repetition.* One member reported the following: "In arithmetic I practiced quick addition. At first I found it difficult to add quickly and correctly, but after much practice I found I could add more quickly and with less effort and obtain equally good results." Another example is that of knitting. The habit of making the necessary movements of the hands becomes so fixed that many people knit without thinking about it and can converse or read at the same time.

After several repetitions an act becomes less conscious and the more times it is repeated the surer it is to be performed at the right time; for example: A young lady who was living away from home had no napkin ring, but after each meal for the first week she folded and rolled her napkin to place it in a ring. One student reports that after forming the habit of winding her watch while undressing before going to bed, she unconsciously does it if she undresses in the day time. One girl who had formed the habit of rapping at the door before entering another suite, unconsciously rapped at the door of her own suite before opening it to go in.

*In consciously forming a habit, external conditions may either greatly help, or hinder.* A certain young lady, who was endeavoring to form the habit of using more correct English than that to which she had previously been accustomed, said, "When I am at home with my own people or in company with those whom I know to be educated and who speak correctly, I have no trouble in doing the same; but when I am with certain girls or people who speak incorrectly and use 'slang,' it is almost impossible for me to avoid speak-

ing in the same way." When one is trying to refrain from eating between meals he finds it very difficult if others are constantly eating in his presence, while on the other hand, if he lives with people who are accustomed to eating only at meal time it is very easy for him. One instance is noted of a child who had been accustomed to using his spoon for everything. One day after having been taught how to use the knife, he was found vainly endeavoring to cut his meat with his spoon and fork. The habit of using his spoon was so strong that it was almost impossible for him to learn how to use the knife. Experience has taught that if we wish to study and accomplish good results we must be alone or where our thoughts can be concentrated. When this is realized it does not take long to form the habit of careful study. One student reports that when a child, during one vacation at home, she was broken of the habit of biting her finger nails, but upon returning to school the habit immediately took its hold upon her again.

*The condition of the mind affects habit formation to a very great degree.* One person tried to form the habit of going to sleep as soon as she got into bed, but she found that this was impossible when she was excited or when she had done very much studying during the evening. Another reported that while studying she tried to form the habit of keeping her feet squarely on the floor. She succeeded in doing this the first part of her study, but when she became tired and nervous it was impossible to keep her feet still. One student told of a member of her family, who, when excited, had the habit of talking and at the same time walking the floor as fast as she could. All attempts to sit still were unsuccessful. Thus it can readily be seen that when the normal condition of the mind is disturbed by excitement, fatigue or nervousness the regular formation of a habit is hindered.

*If the immediate results of an act are unpleasant the act is not likely to be repeated and so has not much chance of becoming habitual;* if, on the other hand, the results are pleasant we are likely to do the same thing again, and thus form a habit. If one wishes to teach a pet kitten to roll over and cuff his ears after the first performance, he will not roll over again; but if, instead of the cuff, the kitten receives a piece of meat he will be more anxious to repeat the act. One instance is given of a little child who had the habit of crawling up on the table and picking up sugar by wetting the tip end of his index finger. The child was punished again and again, but it was not until one day when he accidentally picked up some salt that the habit was broken.

*Some habits help to form others,* thus fulfilling the old saying, "learning to do one thing well aids in doing all the rest." One habit helps to form another just in so far as the general method is the same. The following is an illustration: A young lady who had been in the habit of taking pictures with a No. 1 Brownie learned very readily to use a plate camera, because she was able to judge distance, time, position, and light from her use of the Brownie, as the general method was the same. But with the small camera she had to press a lever to obtain the picture, while in the larger one a bulb was used. This she found to be a hindrance, since she had to break the former habit in order to form the latter.

*Previous experience may hasten or retard the formation of a new habit.* Some time after the experiment with the  $a = x$  text, the students were required to perform some experiments with another key. The tendency to use the old key was so strong that it hindered the progress with the new key. A representative case illustrating this is here given.

43 sec.—Ist trial of  $a = s$  test.

33 sec.—1st trial of  $a = o$  test.

23 sec.—10th trial of  $a = o$  test.

21 sec.—10th trial of  $a = x$  test.

This person was able to do the first trial of the  $a = o$  test in quicker time than the first trial of the  $a = s$  test, owing to the similarity in general procedure. The progress between the first and tenth trials of the  $a = o$  test was not as great as that between the same trials of the  $a = x$  test, because the old key hindered, as was remarked before. The knowledge of general procedure helped at first, but the change of letter prevented rapid progress.

#### HABIT BREAKING

Habits formed in youth are generally the most difficult to break. The physiological explanation of this is that in youth the tissue of the brain is softer than in old age, and therefore the impressions are much more easily and deeply made. The nervous system is similar to the moulder's clay. At first the clay can be pressed and rounded into any shape with very little difficulty. As the work progresses the clay becomes harder and finally so hard that it is almost impossible to mould it further. However, the first form has remained. Each line is firmly fixed and can scarcely be obliterated.

The difficulty with which the first lines in the clay are removed corresponds to the task which attends habit breaking in old age. Too much emphasis cannot be placed upon the importance of the formation of good and wholesome habits in youth.

Habits which are broken unconsciously are generally of as little use as are the habits which are formed unconsciously. The written reports from a class of sixty young ladies con-

tained only two observations pertaining to habits broken in this manner, and they are habits of minor importance, such as refraining from tipping their chairs back while at the table and biting the finger nails.

*The will power is usually the chief agent in breaking a habit.* It is generally necessary to constantly keep the attention upon the habit that is being broken, if success is to be the reward. The amount of will power required varies with individuals, as is shown by the following illustrations. Two girls had the habit of making unkind remarks about their acquaintances. Both young ladies decided to try to break themselves of this habit by the exercise of will power. The resolution of one girl was so strong that she would check herself in the middle of an expression. The other would think, "I've gone so far, I might as well finish." The young lady who had the ability to check herself at any time broke the habit more quickly and permanently.

Another girl broke herself of the habit of playing with a pencil, simply by forcing herself to put it down whenever she caught herself in the act.

*Every time the desire to repeat a certain act conquers the better judgment of the individual, that individual's power is weakened so that it is more difficult to check the impulse next time.* Many people allow their minds to wander when attending a lecture, especially if it is rather uninteresting. This habit of inattentiveness grows very rapidly so that it becomes practically impossible to concentrate the mind when necessary.

*Changing the conditions is often very effective in breaking a habit.*

One girl says she had the habit of asking people to do things for her which she could do for herself just as well. The person whom she called upon was taken sick and she

had to do things herself. Now she does them without thinking of asking any one to help her.

Another reports that while wearing a locket and chain she had the habit of twisting the chain about her chin. Resolved to break this habit, she removed the temptation by not wearing the chain and now the habit is completely broken. Sometimes, however, the habit in such cases is only suspended and appears again when conditions favoring it are restored.

One girl said that in one of the grammar grades a school-mate used to suck his right thumb and take hold of his right ear with his left hand. The teacher broke him of this habit by tying a large red bow on his thumb.

A student had been accustomed to say "chapel exercises" at a former school, but when she came to her present school, she substituted "morning exercises." Change of conditions caused the old habit to be broken and a new one substituted.

*Friends often assist in the breaking of annoying habits and sometimes mimicry is the most useful weapon.* It is reported by one member of the class that she broke her father of the habit of stirring his coffee vigorously when it was unnecessary, by mimicking him. One girl had the habit of making a peculiar motion with her hands when talking, which was broken by her friends, who imitated her every time she did it.

Two examples of latent habit may be cited. One member reports: "When a little child, I acquired the habit of passing tedious hours in church in trying to find out how many words I could get out of 'Congregational.' Now whenever the sermon is uninteresting I find myself picking up the church calendar and going through the same performance." Another: "One of my friends and I always went arm in arm to and from school. We do not see each other very often now, as we are at different schools, but when we do



go anywhere together we always go arm in arm."

It is very difficult, and some would say utterly impossible, to tell when a habit is really broken. One girl relates: "More than a year ago, an addition was built upon my home, causing a door to be put where a window had been. Even now when I go home I find myself attempting to look out of an imaginary window." The illustration gives us some idea of how difficult it is to really break a habit. For this very reason should we not strive to so direct and aid the children in our schools, that good habits may be formed and strengthened, and bad ones broken?

#### SUMMARY

Through our study we have learned that:

1. Habit is the acquired tendency of mind or body to do the same or similar things under the same or similar conditions, when the result produces satisfaction.
2. Habits may be formed by concentration, by repetition, by imitation and by association. During habit formation many changes take place, namely: in rapidity, ease, accuracy, method of procedure.
3. General methods aid in the formation of habit, special acts hinder.
4. Habits formed in youth are the most difficult to break.
5. Habits may be broken by means of will power, by co-operation of friends, and by forming one habit in place of another.
6. The impossibility of knowing when a habit is entirely broken has been brought out by examples of latent habit.

## II

### A STUDY OF MEMORY

#### THE NATURE AND USE OF MEMORY

**M**EMORY is the knowledge of a past event or fact with the additional consciousness that it has previously been a part of one's experience or thoughts.

Remembering can be broadly defined as retaining, but this does not distinguish it from habit, knowledge or imagination. It is necessary to add reproduction, the proof or manifestation of the retention.

An act or impression however might be reproduced without being remembered, as in a habit, so for a more complete act of memory, one must be conscious that the experience is the reproduction of a past event and it must also be located. One must know when the event happened, where it took place or under what circumstances. Therefore, a complete act of memory consists of acquiring, retaining, reproducing, recognizing, and localizing. For example, the scent of wistaria may bring back to one a remembrance of some place with which it was connected, the time, and the circumstances.

#### *Memory Versus Imagination*

Memory is sometimes confused with imagination, because they both involve mental pictures. Memory puts images together in a certain defined way which is unchangeable, but imagination combines free images in various ways according to mood, and bound by no facts. To illustrate, a person

sees a friend riding alone on horseback; later if he recalls where he saw him and how he and his horse looked he has an act of memory. But if he thinks of his friend dressed in khaki, carrying a flag, and leading a band of soldiers, he is using his imagination. He has a mental picture which is quite different from that memory gives.

Sometimes we may imagine things which really never happened. We may have laid so much stress upon the thought at the time, that it became real to our minds. For instance, one person says that she often has to put papers away in order, and if she is in a hurry, she forgets to do so, but afterwards is absolutely sure that she has done it. Then she has to look to convince herself of the truth.

### *Memory Versus Knowledge*

Unless the mind can store up and recall past experiences, no knowledge can be acquired. Since memory is so essential to knowledge, it is important to know how far we should use our memories in connection with knowledge. In geometry it is useless to try to remember any but the most common and necessary theorems. When a problem is to be solved that involves truths not commonly used, it is better to know where they may be found, rather than to depend upon memory for them. In subjects like geography and history, it is well to memorize as much as possible, for generally, if one wishes to know anything about these subjects, he wishes to know it immediately. In learning a foreign language, a person should become so familiar with it by means of memory that it becomes a matter of knowledge.

When one person hears the word "mountain," he thinks at once of what a mountain is, not an exact definition, but a general idea, while the word "parallelogram" calls up a particular definition which he localizes. Another may think

of an exact definition of mountain and a general idea of "parallelogram." In one instance the mind's process involves knowledge, in the other, memory. In the case of general ideas, the subject is known at once, in the other case the associations are recalled. In knowledge, the facts are used without thought of their origin. In memory, the facts are recalled, and the means by which the knowledge was obtained is brought to mind.

### *Memory Versus Habit*

Memory differs from habit in that memory always demands consciousness, while after a habit is formed, the act is performed reflexively and without involving conscious memory. However, in the first stages of habit, memory is useful. When one is forming a habit, he generally needs to think about the act at first. After that he depends upon memory until the act is performed without the intervention of consciousness, the condition which determines the establishment of a habit. For example, when a child first learns to write he has to memorize the symbols which he uses to express his thoughts. After he has written words many times, he depends upon habit for his symbols, and centers his mind upon the idea he is to express.

### *Good and Bad Memory*

Good memory is shown by the distinctness and readiness with which an impression is recalled. He who can recall accurately whatever and whenever he wishes has a good memory. This power depends upon two things: the quality of the individual's mind, and his use of the three laws governing memory, namely, repetition, intensity, and recency. A large majority of people use repetition and therefore spend much time in relearning old things, while those who depend

upon intensity remember facts from once learning, and therefore have much time to advance. Recency always helps, for it is a well-known fact that the mind may recall even the trivial happenings of yesterday, while those of a month ago may be completely obliterated.

To test the ability of the class along the lines of incidental memory the following experiment was used. A week after the box test was given, our teacher asked us to write what the weather of that day was. Thirty-four of the class wrote pleasant, five, cloudy, five, stormy, three, windy, one, cold, and one didn't know.

Oftentimes one is greatly inconvenienced because he has forgotten something very important, and then he is apt to say that he has a bad memory, which is not always the case if he did not at the time realize its importance. It is plain that we forget as much, if not more than, we remember, because if this were not true, it would take us as long to mentally review the happenings of yesterday as it did to perform them. The mind chooses the most important affairs and stores them away while many trivial events are lost. Forgetting is as helpful to the healthy mind as remembering.

A well trained memory differs from a poorly trained one chiefly in that the former is reliable and under control, while the latter is vague, fickle, and involuntary. Ability to receive impressions and retain them is largely a matter of native endowment. But what one remembers and how accurately, depends largely upon training.

### *Use of Memory*

Memory is of the greatest importance to mankind, because we are constantly referring to incidents of the past. Barbarous tribes depend directly upon memory for their history, which is handed down orally from father to son, but with the

progress of civilization, man has come to substitute devices for memory. He depends upon written histories for the records of the deeds and exploits of his forefathers. In a business which involves many details, systems by which time and energy can be saved are in common use. The government issues periodical reports, librarians use card catalogues, teachers keep records of attendance and scholarship instead of depending on memory. Therefore it is evident that every advance in civilization has been made directly or indirectly through memory or its substitutes because the successes and failures of one generation have enabled the next to do better. Many individuals use effective substitutes for memory. A housekeeper who has everything in place and a regular order of procedure may be much more efficient than one who has a good memory and tries to recall where she left a desired article, the last time she used it, or who must go over in mind what she has already done before deciding what to do next.

This means that system and habit are good substitutes for memory. They are always better than memory when many things are to be done, while memory is most convenient when the occasions for its use are few. If you have only half a dozen books, it matters little how they are placed, but if you have a library of ten thousand volumes, system is necessary. If you receive only one letter a week, you can easily remember whether you have answered it or not, but if you are getting fifty, system and a habit of placing them in accordance with it, are much better.

Memory is especially valuable in enabling us to do things that need to be done only once or occasionally and which there is little permanent value in remembering. You need to remember the lesson assignment for to-morrow and the errand to be done to-day, but it would be a waste of energy and

time to remember every assignment and errand of last month. Knowledge of permanent value is not so much a matter of memory proper as it is a habit of acting and thinking. Memory is of value in learning about verbs, factors, parallelograms, etc., but if one has to remember the definition and when and where it was learned, before he can identify a verb, a factor, etc., his knowledge is not as well developed and usable as it is in the case of one who does not need to remember those details. The chief use of memory therefore is to enable us to attend to temporary affairs and to help us to acquire habits and well-developed ideas of meanings.

#### AIDS IN LEARNING AND METHODS IN ACQUIRING

There are three fundamental laws that aid in learning: *repetition*, *recency*, and *intensity*.

##### *Repetition*

Repetition is a prominent factor in learning. Either the words are written, recited or read over and over again or else the thoughts or main facts are reviewed in the mind. Twenty-eight of the girls in class reporting their method of study, said that they used repetition more than anything else in learning their lessons, whereas two reported that they could learn better by concentrating their minds upon the lesson and going over it only once. It is through repetition that a number of facts are taught in the lower grades. They may be presented in different ways but still they are the same facts repeated. If we are to learn anything by heart, either poetry or prose, we use the method of repetition, and if we are teaching it, we use the same method.

##### *Recency*

The second fundamental law is that of recency. One can

remember what happened yesterday much better than a week or a month ago. The following is a good illustration of this fact. About a year ago, one of the girls watched a friend who was doing an embroidery stitch that she had never seen before. She observed very closely to see how it was done and a few days afterward did some of the same kind of work herself with very little difficulty. About a week ago she again tried the same stitch, but all efforts to bring it back to memory failed. From this illustration we conclude that recency plays a great part in our ability to remember, so if we wish to retain facts we need to review them occasionally.

### *Intensity*

The third fundamental law is that of intensity. All can readily remember a runaway or some other very unusual occurrence which may have happened some time ago, while comparatively recent happenings are completely obliterated. A student says, "I can remember perfectly the night of a fire, when the building where I was staying was destroyed. Every incident connected with it comes back to me now, while other events of the same period are completely forgotten."

If one is really interested in any subject, the impressions made upon his mind while studying it are more intense than if he is not interested. A great many pupils tell of how hard it is to learn history, but those who like history never seem to have much trouble in remembering it.

### *Environment and Physiological Conditions*

Conditions of environment may be such that they will help or hinder a person in learning. In the first place, there should be plenty of fresh air in the room. Impure air will make a person feel dull and stupid and unable to do his best



work. The room should be neither too hot nor too cold, for either extreme will hinder good thinking. There should be light enough so that one need not strain his eyes to see, but not so much that it is glaring to the eyes.

Very few people can study well where there is much noise. Only one girl out of fifteen said that noise made no difference with her. A school room should be kept quiet but not too quiet. An atmosphere of industry makes one feel that others are busy and inspires ambition. If it is perfectly quiet there is something in the stillness that draws the mind away from work. The time of day should be considered, especially in school. It is easier to learn hard things in the morning when the mind is fresh and the school program should be planned with that in view. Furthermore, the learner must be comfortable. He must have a seat that fits him, and must be in a position where his mind will not be distracted from his work. One girl says that she cannot study in an easy chair and explains it by the theory that relaxation of body induces relaxation of mind.

A person must also be in good physical condition and not tired, in order to learn well. In the schools of to-day the physical exercises which are a change from mental work help greatly in keeping the child from getting too tired. Some children have been considered dull because of defective eyesight and hearing, but medical inspection can remedy that to a great extent.

### *Use of Sensations and Images in Acquiring*

There are three methods of acquiring knowledge: through the senses, by the use of images, and by association. Repetition which is often classed as one method is simply a means of deepening impressions.

Certain things may be committed to memory chiefly by

means of the senses; for example, in the experiment with visual forms, memorizing by means of the motor sense was illustrated. The children were given figures to learn by tracing the shape on their desks. This proved to be very helpful to them as they remembered each figure by thinking of the movement. No mental image can be formed except by the previous use of one or more of the senses. We could not imagine how a horse looked if we had never seen one, or how music sounded if we had never heard any.

Mental imagery must precede association because association is the connection of one mental image with another.

Let us consider first which method proves most effectual in memorizing visual forms or isolated units such as faces, forms of letters and the like. Of the various methods employed in memorizing, some are adapted to one case while others work better in other instances.

In the thesis experiment with visual forms, we found that the use of the motor sense produced the best results with the children. The imaginative method, that is the closing of the eyes and trying to think how the image looked, proved successful neither in respect to details nor to general proportions. The method of association of the whole with a similar form was tried but this was not as successful as the method of imagination. However, association by analysis was very successful, especially with the Normal students. The figure was such that each part could be associated in their minds with some former image and then reproduced by means of this association.

These tests would seem to prove that in learning isolated units, the use of the motor sense is the best method with children, while with the older students, association by analysis is most successful.

In learning lists of isolated facts, such as dates, errands,

words, letters, dimensions, etc., previous knowledge is of great value. For example, the dimensions of a number of things, such as the width of a desk, the size of a room, the height of a door, were given to the class, first, in terms of the metric system, and second, in terms of our common table of long measure. Out of thirty-five reproduced statements only 9.9 per cent. were correct in the first case, and in the second case, 30.5 per cent. were correct. This shows what a large part familiar terms play in memorizing.

### *Use of Grouping*

An effect of rhythm may be produced in a material without rhythm by arranging it in groups, as was done with a list of numbers read in the class. The numbers were first given to us without any kind of arrangement or grouping. The second time they were given in groups of three at a time, and we were all able to remember them much better by the last method. Therefore it is evident, that with certain kinds of material, grouping or rhythm is a very important aid in learning.

If the material is not such that it can be grouped, some people can remember the facts better by seeing them written on paper, that is, by the use of the visual sense. An experiment made by Supt. S. H. Pratt would seem to prove that in spelling, a combination of two or more senses brings the best results. In addition to a daily test, a weekly review was given. The tabulations are as follows:

<i>Written.</i>	<i>Studied.</i>	<i>Daily Test.</i>	<i>Review.</i>
5 times	0	91.1	88.8
10 times	0	92.5	85.2
15 times	0	91.8	89.0
0	10 minutes	92.5	86.3
3 times	5 minutes		90.9

It will be seen from this, that the combination produces as good results as any in the daily test, and better results in the review.

There are many cases where auditory or visual images aid in learning isolated material. For instance, a key sheet with rows of corresponding letters was used in a class room experiment. Many pupils said that the sound or sight of one letter called up the sound or sight of the other. Some people say, "I never learn to spell a word, I just think how it looked when I read it." This method is applicable only by a small number of people.

#### AIDS IN RECALLING, RECOGNIZING AND VERIFYING

The need of aids in recalling, recognizing and verifying is shown by the following example: "Several times lately I have seen a little girl whom I was sure I had seen before, but where, I did not know. I kept thinking about it and finally I tried to picture her as I had seen her previously. The picture that presented itself was one of a little girl sitting lower than I and looking into my face. Then it flashed across my mind that it was at one of the recent revival meetings, when she had sat in the next seat to the front and I had been on the platform with the chorus. All was plain now. I had located her as to place and then as to time for it was at one of the meetings when the children had sung and I had seen her take her seat. There were only two children's meetings and I know that some other people sat there the first night, so it must have been on the last night, which was Thursday."

There are many ways in which the mind works in remembering, and as a means of investigating these thirty-seven papers on aids in recalling, recognizing and verifying were written by the class. In thirty-one of the papers, association

was mentioned as a powerful aid. Repetition was mentioned eighteen times, distinctness of original impression, eleven, and mental pictures and outside conditions, each seven.

### *Aids in Recalling*

Association is considered the greatest aid in memory. In the term association, we include connection of different impressions of sound, time, sight, position, etc.

Association by sound is exemplified by the following instance: "A little girl wished to tell me about someone named Pearce and she could not remember the name at first. At last she gave it and she said the only way she could remember it was by thinking of pocket-book, another name for which is purse."

Repetition was mentioned in many of the papers as being of great value. One girl wrote, "The first part of the year, I always had to stop and locate the different recitation rooms in the Normal School. But soon the daily practice of recalling them made their location an unconscious process."

But on the other hand, repetition is of very little use in most cases without concentration of the mind. The following is a good illustration of this fact. The Normal School students have seen the pictures in the buildings almost every day since September and yet when they were obliged to mention a certain number of pictures, very few could recall them. One student writes that she has been but once to the Agassiz Museum and yet can recall certain things much better than the pictures which she sees every day but sees almost unconsciously.

A very good example of the aid given by mental pictures is shown in the following illustration: A student having read one of Shakespeare's plays some time before, wished one

day to look up a certain quotation which she had memorized. Remembering that it was near the beginning of the play she confined herself to the first part of the book and unconsciously looked on every right-hand page. When asked why she paid no attention to the left-hand pages she answered that she remembered distinctly how it looked when she learned it and that it had been on the right-hand page. The picture she had formed proved correct, for this was the location of the passage.

Each sense is a powerful factor in fixing impressions in the mind. Appeal to more than one sense at a time has been found to be very valuable. One of the strongest arguments in favor of illustrated lectures is that by the stimulation of both the ear and the eye we receive more impressions than by use of the ear alone. By recalling one of these impressions — either visual or auditory — the other usually follows and we have a clear recollection.

An example is given showing how fear of punishment may affect the memory. A child is told to go to a certain place after school and forgets. A second time she is told, with the same result. The third time she is told that she will be punished if she forgets the errand again and she is very sure to remember.

Pain will impress certain things to be remembered upon even the very young child. He sees the shining nickel of the stove and longs to run his finger along the surface because it is so smooth; but he discovers upon experimenting that it is also very hot. A second time he has the same longing to feel of the nickel, but experience helps him to remember what any number of warnings would not.

Among other sense-aids pleasure holds a prominent place. One of the Normal students made an experiment on another girl who memorized piano selections a great deal. She asked

the girl what pieces she remembered best. The reply was that those which gave her pleasure were best remembered. A very sad piece in a minor key is very often remembered much longer than some bright, cheerful melody. In the Chopin music, which we have been studying this year, it is very noticeable that a great many of the girls always recall some of the sadder passages. Their sadness has beauty and beauty is always pleasing.

Novelty often serves as a spur to memory. A member of one division made an experiment regarding a process of memory of which she had read. The article maintained that if just before going to bed, one looked at a clock set at the time he wished to awake, he would awake at that time. She followed the directions very carefully and the first time she set the watch an hour earlier than her usual hour of waking. The result was remarkably accurate, for her first impression the next morning was the sound of a clock striking the right time. The next night she changed the time again and the results were not so accurate. The third night they were still worse. Since the attendant circumstances were the same each time this student came to the conclusion that her success the first night was due almost wholly to the novelty of the experiment. As the novelty wore off the experiment became less and less successful.

In the same way that recency of experience aids in learning, so it is an important factor in the recall of details.

Memory is controlled to some extent by knowledge. No one would say that he had seen a man twenty feet tall, for his common sense would tell him that no such thing would be possible.

That the memory may be trained by use and the habit of observing is shown by the following example of a person who trained his memory so perfectly that he is able, after passing

a store window and glancing at the articles displayed, to describe everything in the window. But the same writer knows a girl who walks along the street and has no impression of people who pass by, nor does she remember the persons when remarks are made about them.

Many people depend upon a simple nonsense rhyme as an aid to recall, rather than upon learning a thing outright, as is shown by the following results. Out of a class of sixty-nine it was found that sixty-one use the rhyme "Thirty days hath September" in remembering the number of days in the months, forty-seven making use of it always, and twenty-two occasionally. One was found to have a device of counting on the knuckles to find the number of days. Only seven were found who really learned the number of days so that a rhyme or device of some sort did not need to be brought into use. Under the same heading would come the rather old-fashioned method given to the children for remembering the sharp and flat scales, namely, "Good deeds are ever bearing fruits" and "Farmer Brown eats apple dumplings greedily." This method may in some cases be advisable, but it seems rather trivial when men and women are obliged to depend constantly upon nursery rhymes.

### *Aids in Verifying*

Just as we recall by association, we verify by association. The following account shows how an impression may be verified from known facts. A girl knew that she had gone down town on a certain day, at a certain time, for she remembered saying that she didn't care if she couldn't get the hat she ordered that day, for Easter. She knew it must have been on Friday, for she remembered hearing her companion say that she had an appointment at four, which she always had on Friday, and it was remarked that it was very near



that time.

Some people verify by the help of others, and some by authoritative means. This is illustrated by the following instance from the paper of one student. "Many times questions come up at home concerning the location of some town or city, or the distance from one place to another. My parents generally ask me, instead of relying on their memories, because they think I have studied the subject since they have. If the answer given satisfies them I come to the conclusion that I have remembered correctly, but if not, I usually go at once to some reference book in order that I may discover whether I am right or wrong."

### *Results of Experiments*

During our study of memory, several experiments have been made to illustrate and prove different points. The first was the box test, explained in the appendix and in the tabulations on the following pages.

The records for the three divisions of the Junior Class of the Normal School supply valuable material for comparison. Allowing for the difference in the age of the children, the records for the grades in the Edgerly School also furnish good material.

The tabulation shows that immediate reproduction after the reception of sensation is more exact than recall after an interval. There are only two out of the eight cases cited that might contradict this statement: Grade VII, Perception, where correct reproduction is only one-tenth of a word more than correct recall; and Junior II, where correct reproduction is only five-tenths of a word more than correct recall. These results would seem to furnish proof that recency of impression is a very powerful aid to memory.

Making allowance for difference in age in the eight cases

## EXPERIMENT I — BOX TEST

	Reproduction				Recall				Recognition			
	Av. Total		Av. Right		Av. Total		Av. Right		Av. Total		Av. Right	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Junior I. Perception....	9.	75	9.	..	10.	84	8.	72.4	11.	95	10.	83.3
Junior II. Perception...	9.	75	9.	..	9.	84	8.5	88.	11.	..	10.3	...
Junior III. Perception..	9.	75	9.	..	7.6	63	7.4	62.	10.2	85	9.6	80.
Grade VII. Image .....	7.7	..	7.4	..	6.5	..	5.8	...	12.	..	10.1	...
Grade VII. Perception..	7.8	65	7.2	..	7.4	..	7.1	...	9.6	..	8.3	...
Grade VI. Names only..	5.7	..	5.2	..	4.6	..	2.8	...	8.9	..	7.	...
Grade V. Perception ...	10.	..	8.8	..	9.3	..	6.7	...	10.8	..	8.6	...
Grade IV. Image .....	...	..	5.	..	...	..	4.4	...	...	..	8.1	...

## EXPERIMENT II — FAMILIAR AND UNFAMILIAR EXPERIMENT III — CONNECTED READING TEST, 200 WORDS

	Reproduction		Recall		Reproduction		Recall	
	Familiar	Unfamiliar	Familiar	Unfamiliar	Right	%	Right	%
Junior I .....	25.7	18.3	...	8.5	...	57.6	...	34.7
Junior II .....	...	...	4.5	.3	...	62.5	...	...
Junior III .....	29.	15.6	25.7	..	...	...	...	...

## EXPERIMENT IV — TWELVE WORD TEST

	Reproduction			Recall			Recognition		
	Total No.	No. Right	Total %	Total No.	No. Right	Total %	Total No.	No. Right	Total %
Junior I .....	8.9	8.6	71.6	5.9	4.7	39.1	8.9	8.6	71.6
Junior II .....	..	9.3	...	..	6.2	...	..	..	...

## EXPERIMENT V — FIFTEEN WORD TEST

	Reproduction		Recall	
	No.	%	No.	%
Junior I .....	13	86.6	7	46.6

## EXPERIMENT VI — LETTERS RECALLED

	In Words		Nonsense Syllables		Disconnected Letters		Greek Letters	
	No.	%	No.	%	No.	%	No.	%
Junior .	88	87	1	4.5	..	..	8	5.6

under the Box Test, we are still able to form a comparatively true idea of the relative force of the auditory and visual senses. Compare Grade VI with Junior I, II, and III, Grade VII, Perception, and Grade V. It will be seen in the columns "reproduction" and "recall," that where the ear only was appealed to (Grade VI), the results were very much poorer than where the eye alone was appealed to.

Forming mental pictures has seemed to produce very good results. Grade VII, Image, and Grade VII, Perception, furnish the best field for observations along this line. Grade VII, Image, stands above Grade VII, Perception, in both reproduction and recognition, but falls below in recall. This points quite clearly to the conclusion that imagery is a powerful factor in immediate reproduction, and is also easily influenced by suggestion, so that it facilitates recognition, but it also shows that the memory of things imagined is not so fully under the control of the will, as of things perceived.

Another experiment (II), by the three divisions of the Junior Class aimed to test the power of familiarity as an aid to memory. A short paragraph containing many measurements in the common units, foot, yard, etc., was read to the class. It was reproduced immediately, and recalled about a week later. The same paragraph with the measurements changed to the metric system (a system known to the classes, but used by them very seldom) was read and reproduced, and later recalled. From the averages tabulated under Experiment II, it will be seen that the familiar terms are much better reproduced and recalled than the unfamiliar terms. In the case of Junior II, both paragraphs were read at the same time, and not reproduced at all. About a week later they were recalled, but with very poor success as to the latter. Immediate reproduction of unfamiliar terms is comparatively successful, but recall after an interval gives very poor re-

sults; whereas, recall of familiar terms after an interval produces almost as good results as immediate reproduction.

Experiment III was the "Rousseau Test" referred to in the introduction. This experiment should be compared with the two following ones, as it was made to illustrate the effect of the amount to be retained upon memory.

The next two experiments, IV and V, were very similar. Two lists of objects were read. The classes reproduced immediately, then recalled some time later. In spite of the fact that experiment III dealt with connected ideas, experiments IV and V were more clearly remembered. This is due to the fact that increase in amount received produces increased difficulty in remembering.

In experiment VI, cards in groups of ten with letters printed on them were shown to the class for a few seconds and reproduced immediately after. In the first case, the letters formed words, in the second, nonsense syllables; in the third, they were wholly unrelated and could not possibly be pronounced as words; in the last case they were written in Greek characters which were familiar to part of the class. The letters grouped to form words were by far the best remembered. An explanation of this fact may be found in association. The thoughts produced by the meaning of the words aided the visual sensation in stamping the letters upon the memory. In the second case, the imagined sound of the groups of letters aided the visual sensation, but in the third case the eye alone was used. The last case was also almost wholly a visual sensation, as the characters were unfamiliar to a great many. It therefore seems that appeal to more than one sense at the time of impression is of great value in getting correct results in memory.

From experiments I and IV we find that memory images are recognized with a much greater degree of accuracy than

they are reproduced either immediately, or recalled after an interval. This seems due in both cases to the fact that some impressions are more vivid than others, and so are more capable of voluntary recall. Therefore the weaker impressions are overlooked unless some outside conditions bring them to mind. In the recognition tests in experiments I and IV, the reading of the two lists acted as a stimulant to the memory so that even the weaker impressions were recognized as having been received before.

Doing for oneself fixes ideas more firmly in the mind than any amount of observation. That is one reason why the experiments made individually by members of science classes are so much better remembered than those which are simply demonstrated by the teacher. The student who investigated the matter of memorizing music, found that her subject remembered much better a piece she had played through once herself than one that she had heard many times. Allowing for the difference of impression made by the different pieces, she still considered it a proof of the statement that those things which we do for ourselves, whether mental or physical, remain in memory much longer than those which we see others do.

#### AGE, SEX AND INDIVIDUAL DIFFERENCES

In making a study of this phase of memory, it is found that there are many marked differences owing to age, sex and individuality.

##### *Differences in Age*

There is one most striking difference in the power of memory of a child and of an aged person.

Recency is a most important factor in the child's memory, while it does not have so much influence over the older person.

If an elderly person is asked to relate incidents of his youth, to describe his early home and friends, it will almost invariably be found that he can do so immediately, and that the mental images will be very distinct. If, instead, one should ask this same person to recall some of the happenings of a few years past, it will be found that he can not do this as readily.

### *Differences in Sex*

From experimental tests it has been found that boys have not as good memories as girls. This is due, perhaps, to the different centers of interest in the boy and girl.

An illustration of this is seen in the following incident. A young lady and her brother attended a ball game. It was remembered for some time by the boy but was soon forgotten by the girl whose interest in the game was not as great as that of her brother. Thus it is a universal fact that memory depends greatly upon interest.

The box test given in the sixth grade will show differences between sexes.

### *Sixth Grade*

	<i>Girls</i>		<i>Boys</i>	
	<i>Av. No.</i>	<i>Per cent.</i>	<i>Av. No.</i>	<i>Per Cent.</i>
Remembering . . . .	4 $\frac{5}{6}$	43	3 $\frac{1}{6}$	35
Recalling . . . . .	3 $\frac{1}{3}$	23	2 $\frac{2}{3}$	27
Recognizing . . . .	7	63	4 $\frac{1}{2}$	45

Although the girl's memory is discovered to be, for the most part, better than the boy's, it has been found through experiments, that once an idea is firmly fixed in the mind of the boy, it is there to stay.

### *Individual Differences*

Besides the differences of age and sex, there is also an important difference dependent on the special individuality

of persons. Some have special native endowment. It is very seldom that a person is able to remember all things equally well, although this is not an entire impossibility. Most people are gifted in one particular phase of memory. Some common instances of special native power are shown in regard to historical dates and facts, mathematics and literature. The following illustrations taken from reports show this. A young lady who is not able to remember the simplest process in arithmetic is always able to mention a historical date or fact in connection with any subject.

A young student is extremely quick and accurate in mathematics but cannot recognize any allusions in English literature or remember any of the foreign languages.

A certain girl after glancing over her reading lesson two or three times is able to repeat it in almost the exact words of the writer. Another child in the same room who seems of average brightness in other studies, is unable to recall any of the reading lesson, even after a longer period of study.

Besides these innate differences there is a difference dependent upon the sense appealed to. One person memorizes a verse when read to her, while it is entirely necessary that another person see the verse in order to remember it. Here a different sense is appealed to. This difference is also seen in the playing of a piano or other instrument, by note and by ear.

#### SUMMARY

(1) Memory is that function of the brain which gives man the power to look into his past. Memory differs from imagination in that memory always makes use of definite images, while imagination makes use of free images; from knowledge in that recollection always requires an effort, while the facts in knowledge are reproduced without effort; and



from habit, in that habitual acts are accomplished without the intervention of consciousness, while memory depends directly upon consciousness.

(2) The prominent laws of memory are the same as those in learning, namely, repetition, recency and intensity.

(3) Isolated units and facts, and related ideas are remembered through the aid of the senses, mental imagery and association.

(4) Associated knowledge is a most powerful aid to recalling, recognizing, and verifying. The greater the number of associations, the greater the likelihood of correct results.

(5) Repetition is useful in fixing ideas. Repetition with concentration assures retention.

(6) Appeal to the visual sense gives better results than appeal to any other one sense. Appeal to more than one sense at a time produces vivid impressions for future memories.

(7) Nonsense rhymes are of some value in a few cases. Familiarity with a subject makes recall more certain.

(8) Increase in amount of memory material given at one time increases the difficulty of retention.

(9) As man ages he loses the power to retain new things, but can readily recall the incidents of his youth.

(10) Memories of boys and girls differ according to their centers of interest.

(11) Special memories are due greatly to the native powers or the special training of certain individuals.

### III

## IMAGINATION

### NATURE AND USE

**A**MONG the faculties of the mind we find that imagination plays a very important part in the development of the human race. It is a source of pleasure and profit. Without it our knowledge would be limited to those things which we have actually experienced, and our lives would be narrow and uninteresting.

A common conception of imagination is that it deals merely with the fanciful, impossible, and poetical. In reality, imagination is that power of the mind which creates images without the immediate aid of the senses. It also brings forth former images under the same or different conditions.

#### *Contrasted with Memory, Reason and Perception*

Memory and imagination interlace in various ways, yet each has its distinguishing characteristics. Imagery is common to both, but they differ somewhat, in that memory uses the images of the past, recognizing them as such, while imagination may reproduce, construct or create according to desire or fancy.

To illustrate the connection between reasoning and imagination, the following question was asked: "How many inch cubes can be placed around a surface four inches long by four inches wide?" From the results we found that some

students reasoned by means of symbols entirely, while others depended on pictures constructed by the imagination, and still others, on both these agencies. The results of the latter proved most successful.

Again, we find a relationship existing between perception and imagination. The former is the result of actual stimulation of the sense organs, while imagination may give us mental experiences only a little less vivid, when the senses are not being stimulated. It may also aid perception by picturing former sensations like those being experienced at the time.

### *Use and Value*

In discussing this subject some thought must be given to the practical side. A wide field of knowledge is open to those who are able to use their imaginations freely. Were it not for this medium books and periodicals would be meaningless to many people. How much could any of us get from Carpenter's Geographical Readers without the aid of our imagination?

When a child is able to form clear images of different conditions, to such a degree that he seems to live right in the midst of them, history becomes a living subject. His imagination may complete and perfect the descriptions of great men and women until he feels as though he were actually acquainted with them. He is thus enabled to mentally see events in other ages as well as other places.

One of the Normal School girls who had studied descriptions of the school and its surroundings depended chiefly upon her images thus formed to guide her about the buildings and the adjoining neighborhood until she became thoroughly familiar with them. A successful teacher finds it most profitable to appeal to the imagination of her pupils. By this means she may arouse their interest and lead them

to gain knowledge more readily. An illustration of this was seen in the training school, when the teacher had the children take an imaginary trip to an extensive wheat field in the West. The result was that the children were able to reason out the answers to her questions more quickly and accurately.

### *Misuse*

As many other faculties of the mind are often misused, so is imagination. In children this misuse often takes the form of falsehood. They have such vivid imaginations that unrealities often seem real and frequently lead them into telling untruths.

An overwrought imagination sometimes brings disastrous results. The following true story is an example of this. "A boy who was eating dinner suddenly began to choke. His parents became alarmed and called a doctor, who examined the child but could find nothing wrong. Nevertheless, the boy continued to grow worse and finally was sent to the hospital, where an operation was performed. Still the cause of the choking could not be found. As a last resort the doctor told the boy that the object had been removed. Immediately he began to improve, and soon had entirely recovered."

Ghost stories and goblin tales often have a very bad effect upon children. They cause a fear of being alone and in the dark, which often remains when the children have become men and women.

### MENTAL IMAGES

Mental images are what might be termed pictured sensations. The word "pictured" is used in the broadest sense, meaning that we may form images, not only of things seen, but also of things perceived through the other senses.

*Memory and Free Images*

There are two classes of mental images, memory and free. Suppose the word "house" is mentioned to two different persons; one recalls the image of a particular house, while the other forms a general idea and thinks of no individual house, although he too has formed an image.

The former has a memory image, the latter a free image. Memory images are the more common. In a class of twenty-six pupils the following experiment was made which tends to prove this statement. The word "book" was given and the class was asked to write down the different kinds of images called forth; likewise with the words "house" and "apple." Of the twenty-six, 77 per cent. had memory images only; 15 per cent. had free images, and 8 per cent. had both. Experiments with other classes had like results.

*Kinds of Images*

All images belong to one of the following classes: Visual, auditory, motor, olfactory (smell), gustatory (taste), or tactile (touch). Of these the visual are by far the most vivid and most common. In a class experiment almost every member had visual images. One had a verbal image of the words "book," "horse," and "apple"; about 12 per cent had gustatory images in the case of the latter. When the word "rose" was mentioned 4 per cent had olfactory images, 4 per cent motor and 4 per cent tactile. There was of course no chance for auditory images in this experiment. Other experiments have shown, however, that these are next to the visual in prominence.

Many people have very vivid motor images, as in the case following. Dr. Stricker says, "If I try to call up in my memory the walking movement of another person, such as a soldier marching, so as to imagine him first in one position,

as standing firmly on the ground, and then as lifting his leg to take a step at the command 'March,' I notice that I am thinking of the movement of the upper part of my own thigh."

Olfactory, gustatory, and tactile images are rare, although sometimes quite vivid. The reason that visual and auditory images are so common is probably because the eye and ear are used so much more than the other senses.

### *After Images*

Often when a person has looked at an object for a time and then closes his eyes, he finds that an image appears, the colors of which are complementary to those of the real object. If the color is red, the after image is green, and if it is blue, the after image is yellow. This is especially apt to occur when the eye is tired. Such images are called negative after images. When the exact images appear in the correct color they are called positive after images.

### *Images and Concepts*

An image differs from a concept and must possess the qualities and peculiarities of an individual object. It is impossible to image anything without giving that image individual characteristics; for instance, in picturing a person we always remember the most prominent features.

A concept must embody only those qualities which are common to the entire class. A partially generalized image, such as that of a tree with trunk and branches but of no specific kind, is somewhat like a concept, but the latter includes a knowledge of the nature and use of trees as well as of their form.

### *Hallucinations*

Hallucination is the name given to an image of such ab-

normal vividness as to be mistaken for a percept. It has no sense stimulus, but appears with all the other characteristics of the percept and sometimes it is even more vivid. While grieving for a dead relative or friend, one sometimes sees the image of that person, perhaps sitting in a chair as though alive. A percept is usually under voluntary control, while a hallucination is not.

An illusion differs from a hallucination in that it is a false perception with a sense stimulus. For instance, clothing over the back of a chair may cause one to start, thinking he has seen a person.

Delusion is continued illusion or hallucination accepted as true or real.

#### KINDS OF IMAGINATION

Imagination may be divided into three classes: reproductive, constructive and creative, according to the amount of mental rearrangement of images involved.

#### *Reproductive Imagination*

Reproductive imagination is the process of reviewing percepts arranged according to the time, place and order of their occurrence. Such imagination bears such a close relation to memory that it is very difficult to distinguish one from the other.

A box containing many different objects was shown to a class of pupils. Mental images of what was in the box helped in recalling the contents at another time, but images of things not in the box were also reproduced, and thus imagination both helped and hindered memory.

The following instances illustrate the practical use of this kind of imagination. Certain members of a class who memorized a selection were able to picture mentally the exact

place where the selection was found in the book.

A man who needed a letter for reference closed his eyes and saw the written words before him. By this mental picture he was saved the trouble of going to his desk and re-reading the letter.

Reproductive imagination may be of great value to a teacher in telling children of things which she has seen in places unfamiliar to them. Instances of this were shown in the talks given to the Normal students by members of the faculty who used their reproductive imagination to bring into play the constructive imagination of the pupils.

### *Constructive Imagination*

Constructive imagination is the placing of images in a certain form according to given directions. This kind of imagination was used to a great extent when the class was asked to compare the height of Mount Wachusett with that of the Normal School building; also when asked to compare the relative size of gill and quart measures.

Again it is found of great importance in school work, especially in the teaching of history and geography. For example, if the children are studying about a mountain and have never seen one, they must first think of a hill. With this as a basis they must construct mentally a larger elevation as directed, until they can form an image of a mountain or of a range of mountains. It is by proper use of this kind of imagination that we get correct ideas of all sorts of things we have never seen.

### *Creative Imagination*

Besides reproductive and constructive imagination, we have a third form which is called creative imagination. In this variety the activities of the two previous kinds are com-



bined and used, not according to direction, but according to individual taste.

In planning a house or arranging its contents we image things we have seen, change and combine them, then arrange them in such a way as to give a result pleasing to ourselves but different from any seen or heard of. Creative imagination is prominent in children as well as in designers, inventors, artists and poets.

### *Development of Imagination*

It is obvious that from the very beginning of a child's life simple images play an important part in his mental growth. At no very late stage of his development he begins to combine freely his simple images into higher forms and commences to build a world according to his own imaginings.

In play the child unconsciously uses imitation to a great extent, which aids his imagination. A little girl delights in playing with her doll, which is to her a real person. When pretending the doll is ill, she cares for it, just as she herself has been cared for by her mother. A child who has seen a parade or a very large building often constructs a miniature one with his own blocks.

Mother Goose Rhymes are the first stories to interest children. These seem real and the children often act them out, according to their own ideas of what is pictured. Fairy tales and myths interest them soon after the Mother Goose age. How fascinating are the fairies and brownies to the child with a vivid imagination! He forms vivid images of these stories, as is shown by his insisting on the same words and facts every time the stories are told.

The forming of new combinations by the child is more noticeable when he begins to tell stories himself.

Little control over the imagination is evident during child-

hood. Mental pictures seem to build themselves and the child is often unable to prevent it or to change them into a form more pleasing to himself. For example, a certain little boy imagined that when he went to sleep he was going to die, and he therefore had a great fear of sleep. If a child hears beautiful fairy stories rather than horrible ghost stories he is much more likely to have lovely fancies instead of fearful pictures.

The child's studies in the early grades act as stimuli to his imagination. Geography and history are important factors in this line. When he reads or hears about unfamiliar people and places he sees them mentally and this exercise strengthens his power to image. Imagination plays an important part in drawing. To draw a cube from memory correctly, the child must first have a mental picture.

The first great change in the development of the child's imagination comes after he has passed through the primary grades. Henceforth he forms his images with a purpose and compares and modifies them. For instance, he can form an image of a house in China by comparing it with a house familiar to him. Now the child questions his images and becomes more curious as to the truth of them. He begins to wonder if the fairy tales are true, and if fairies and brownies really do exist. His images now take a more definite form and arrangement.

In school, the teacher of geography and other subjects should question the children about their images to be sure that they are accurate because ideas gained through images are not easily corrected. The powers of imagination should not be abused by too much day dreaming. The more the mind is allowed to hold fanciful ideas without doing anything to realize them, the more difficult it is to settle down to earnest work.

## ASSOCIATION OF IDEAS

The association of ideas is the true life of the mind, just as protoplasm is the true life material in nature. It is the connection of ideas, thoughts and mental pictures.

It is well known that association is an aid to memory. The following taken from the *Youth's Companion* illustrates this: "A Boston family had just moved and one of them remarked to the succeeding tenant, 'We did hate to leave such a good telephone number; it was so easy to remember.' 'Do you think so?' returned the other. 'We haven't found it so.' 'Why,' said the former occupant, 'it was 1066, the date of the Norman Conquest.'"

Association in connection with imagination forms an important topic. Our ideas can not be isolated since one depends upon another. Each idea, as it comes before us, reaches, on the one hand, back into the past and, on the other, forward into the future. Unless we possess this power of association our knowledge of the world will be limited. The repetition of the association causes the thought to become more firmly fixed. An example of this is shown in the learning of the multiplication table. We repeat it over and over, " $9 \times 14 = 126$ ," until at last the number "126" is so firmly associated with  $9 \times 14$  that we cannot possibly forget it.

Intense and recent associations have the same results. One Saturday afternoon just before Thanksgiving, two students amused themselves by following out a number of trains of thought. No matter how they started they always arrived sooner or later at the subject, Thanksgiving, because that thought was uppermost in their minds at the time. In former times children were taught their lessons by means of repetition. In modern times an attempt is being made to substitute interest for repetition, as far as possible, because

it is so much more effective. Ideas which have been associated frequently, intensely or recently will surely recall one another.

In actual experience associated ideas are affected by other related ideas and the entire order of thought helps to determine which idea shall appear at a given time. If the idea of multiplication has just been in mind the numbers six and eight will suggest forty-eight. If addition, those numbers will suggest fourteen. In both instances the ideas six and eight are present but the following idea depends upon the general thought preceding. In a similar way our memory of particular words in poetry or prose depends upon the entire set of verbal associations with which they are surrounded.

Ideas do not stand alone in the mind but are connected with many other ideas; for instance, if Fitchburg is suggested to a certain student the following train of thought is produced: the printed word "Fitchburg," generally in a newspaper, suggests a view of Fitchburg from a distance; the main street of the city, the map that was drawn in geography class, the location of Fitchburg on a map of Massachusetts.

When our minds are engaged upon a definite line of thought, such as the solution of a difficult problem in mathematics, each idea which presents itself to the mind bears a close relationship to the matter in hand. When we are overcome by sorrow all ideas center about our grief. Thus in addition to the simple laws of association our purposes and our interests are important factors in association. The foolish fancies of dreams illustrate what may occur when all the purposes which dominate association have been removed and the associative machinery is allowed to run wild.

There are various types of association determining our

mental pictures, such as association by contiguity, similarity, contrast, etc.

The primary law of association is known as the law of association by contiguity. Under this form of association images follow each other and arrange themselves in ways most common in previous experiences.

This is not true when similarity associations prevail. If we see a person who has features or other characteristics resembling those of an acquaintance, we immediately form a visual image of that acquaintance. Now this image comes not because the two persons have ever been seen together but because some feature, tone of voice, or gesture is like that of the familiar acquaintance.

As to the value of association by contiguity as compared with that of similarity, the latter is considered the more valuable, because, as one writer says, "association by contiguity is merely arbitrary, while that of similarity is arrived at only by exercising the powers of the mind in reflection and investigation."

The use of language illustrates both these kinds of association. If a person wishes to teach a foreign child the word "red," he says "red" and then points to something of that color until the two are associated by contiguity. On the other hand, in learning a foreign language such as Latin, one is apt to reason somewhat like this: "Imperator," that is like our English words "imperial" and "imperious"; it must mean "to command," or something like that.

In teaching children whose reasoning powers are not developed, association by contiguity should be used, but the teacher should help develop associations of similarity by leading children to notice and recall similarities.

Association by contrast is really a modification of contiguity and similarity. Things are not felt as contrasting un-

less they have some element of likeness; thus sweet suggests, not red but sour, and black, not heavy, but white.

Children's ideas are often confused; in geography they may think that rivers flowing north are running up hill because North is up on the map. Ease and accuracy in the use of the imagination depend very much upon the association of ideas that children form in school. Consequently it is important that their minds should be richly stored. We get the material for forming our associations from reading, travel, and intercourse with other people, especially the last. So if we always mingle with one "set" or "class," and always read one kind of book or magazine, it follows that there will not be a great variety in our associations.

## IV

### ATTENTION

#### NATURE OF ATTENTION

**A**TTENTION is the focusing of the mind. Good attention may not be successfully given to more than one thing at a time, unless it be to things which tend to the same end, like singing a song while playing the accompaniment, because that is in itself a unifying process. An experiment was given in which the pupils were told to write one poem and recite another at the same time. Those who succeeded gave their attention first to one thing and then to the other, or else they did one mechanically and gave their attention to the other. In either case it required more time than when the different acts were done separately.

If a person attends to one thing exclusively, a more concentrated attention results. For example, in listening to a song on the victrola the students were asked to center their thoughts entirely upon the voice. In doing that, the accompaniment and all else faded from their thought and attention and they heard only the voice of the singer.

One great characteristic of attention is its grouping tendency. If things are grouped many more can be attended to than if they are not. For example, long rows of figures were shown for a second or two to the class. When the figures were grouped, very long rows were remembered, and when they were not, each member of the class instinctively tried to group them. Five or seven marks on the board

could be seen without grouping, while twenty-seven or more could be seen only by grouping.

Another phase of the nature of attention is shown when a person adjusts or directs his attention. For example, when a person wishes to get up early in the morning, usually, when retiring the night before, he thinks and ponders over it and adjusts his attention to that one fact, often really awaking at that particular time the next morning.

An example was given in class illustrating this point. "There was a person sick in the house and another person had it on his mind to awake when he heard the voice either of one of the children or the sick person. He fell asleep and no other sound could wake him, but when he heard one of these voices he immediately awoke."

We do not notice the ticking of a clock, the noise of the city streets, or the roaring of the brook near the house, and even the din of a factory will not disturb the thoughts of its workers if they have been there long enough and so have become accustomed to it. The reason for our unconsciousness of these things is certainly not the mere blunting of the sense organs. Were the sensations important enough, we would adjust our attention for them, and notice them.

Moving objects and sounds, especially the human voice, usually attract one's attention. We find also that such things as give us pleasure or lead us to anticipated pleasure readily receive our attention, while we usually turn away from the disagreeable unless it forces itself upon us.

Another peculiarity of attention is that of analysis. The following illustrates this. "First we looked at the famous picture of 'The Last Supper.' We saw the picture as a whole, then our attention was directed to the disciples, arranged in groups of three, and all else became dim. Sud-



denly our eyes caught sight of the Christ, the disciples all seeming to be centered on Him, and we saw only 'Christ sitting in the midst of them.' ”

Attention may save us from mistakes even when we are quite sure of what we wish to do. One student spoke of going to a dentist. His office was on the third floor in a block. She knew perfectly well which floor the office was on and that it was necessary to turn to the right at the head of the stairway. While ascending the stairs her thoughts were on the errands which had to be done. There were six, though only five could be recalled. When the top of the stairs was reached the turn to the right was made. She entered the room and sat down still pondering over the sixth errand. After sitting there a few minutes, she wondered why the dentist did not come into the room. Glancing about she was startled to see that the room did not look familiar, and still more startled upon glancing at the ground-glass door, to read —, Attorney-at-Law. She left the room quickly and upon reaching the corridor and looking about, saw that she was on the second floor instead of the third.

From the above treatment of the subject and the examples given, we conclude that attention is the concentration of the mind, consciously or unconsciously, upon certain objects, thoughts, and acts. This involves activities of adjusting, selecting and analyzing or grouping. Attention selects what we shall know, clarifies our thinking, arouses one emotion or another and directs all our doing.

#### IMPORTANCE OF ATTENTION

Attention forms character. By paying attention to that which others do, and imitating or avoiding it, we are influenced either for good or evil. The girl whose attention is

given chiefly to dress develops a weak, silly character. The boy whose attention is directed to finding all methods by which he can shirk his work becomes worthless and unreliable.

If for no other reason than that it saves time, we should learn to concentrate. For example, by reading a problem in arithmetic through once and paying close attention to it, ability to solve it is much greater than if it were read many times without concentrating the mind upon it.

Through attention we increase our pleasure. If we are to enjoy music we must listen carefully in order to appreciate the intertwining melodies and contrasting chords. Or again, if we stroll through the woods without noticing our surroundings, we do not enjoy ourselves as we would by observing the birds and flowers about us. All persons attend more or less closely to something and they become different chiefly because of what they attend to.

#### KINDS OF ATTENTION

There are two kinds of attention, namely, *voluntary* and *involuntary*. *Voluntary* attention is the conscious concentration of the mind under the impulse of desire; as, for example, when a boy becomes interested in water wheels, he studies an encyclopedia to find out how they are made. In voluntary attention one attends not merely because his attention is attracted but to accomplish a purpose. Such attention is easy when the thing attended to is agreeable but may require a good deal of effort if it is uninteresting. Learning a poem or musical selection may be very easy for one and hard for another.

*Involuntary* attention does not involve purpose but the mind is acted upon by the force of the stimulus presented. Involuntary attention increases when fear, curiosity, or other strong emotion is excited. It is sometimes called reflex at-

attention since the stimulus is from without and acts independently of the will. Such attention sometimes results in unintentional learning, as related by one student. "Last Christmas a friend gave me a motto, which I hung on the wall near my dressing table. I had no idea of learning it, but in a few weeks I was able to repeat it word for word."

Familiarity serves as a great stimulus to involuntary attention, as may be illustrated by the following example: "At the opening exercises one morning, I did not feel like singing, so I decided not to. It happened that Miss P. played a very familiar hymn, and without realizing it I was soon singing."

Involuntary attention reveals a person's character, or at least his tendencies. It indicates whether a person is frivolous, vulgar, interested in science or alert to beauty. The painter gives his whole attention to a beautiful sunset, in which the peasant sees only the approach of night. The botanist finds interesting specimens where the farmer sees merely worthless weeds. Thus previous acts of voluntary or purposive attention greatly influence reflex attention in after life.

#### TYPES OF ATTENTION

Observations have shown us that there are different types of attention, varying greatly in different people, affected by their individuality and environment. There are four principal types: prolonged, diffused, quickly shifting and completely concentrated.

In prolonged attention one applies himself to a certain task perhaps for hours and usually cannot shift his attention readily. As we stand and watch the people who are counting the silver certificates in the vault of our government building, we at once say that here is an example of prolonged attention. Such attention was needed when a

group of high school students were required to spend five consecutive hours in writing a composition on a given subject.

The second type of attention, namely, diffused, is shown in the following examples, where, through necessity, the person gives attention to more than one thing at a time or seems to do so.

“In a country church service, after the sermon had begun, there appeared in the doorway two people who hesitated about entering. Without stopping his sermon the minister went down the aisle and ushered them to some seats, all the while continuing to speak and keeping the attention of the people on his sermon during the entire proceeding.” Another instance of this type was shown by the organist playing the recessional at church. His attention was apparently on his music but he was aware of the movements of the people and when to cease playing.

The third type, shifting attention, is shown when the attention is transferred instantly from one task to another, then as quickly shifted back again. One student wrote: “Last summer while in the Grand Central station in New York City, I observed a railway official who possessed the ability to answer all kinds of questions pertaining to the movements and connections of a large number of trains. As he answered each inquirer satisfactorily he would turn to the next, sometimes even changing to the German, French, and Italian languages.” Another student told of observing a telephone operator at work. The latter turned quickly from answering a call on one line to another line, then to a third, and so on.

In the fourth type, complete concentration, the attention is centered so strongly that outside stimuli, unless extremely intense, have no effect. An amusing incident was told of a

man who became very much engrossed in an article in the newspaper. A friend cautiously set fire to the paper. It blazed up, but not until the heat of the fire reached the man's fingers did he realize the situation. One student told of the way in which she concentrated her attention so entirely upon her letters, after getting them at the hall and starting for the third floor of the dormitory, that often she found herself ascending the attic stairs.

These different types of attention are all useful for various purposes. The type most prominent in us depends in part upon our natural tendencies and in part upon what we have been doing. A student of the concentrated type may at first fail in teaching because she can attend to only one thing at a time and cannot quickly shift to something else.

#### ATTENTION AND THE MENTAL PROCESSES

This subject is of especial interest to teachers because it is so closely related to the acquiring of knowledge. It is closely correlated with memory, habit, imagination, interest, sensation, will power and movement.

#### *Attention and Memory*

Attention is the dominating factor in the development of one's mental powers, especially memory. Attention is one of memory's greatest aids. If we wish to remember anything we must attend to the stimulus in order that it may make an impression deep enough to remain, and the longer and more concentrated the attention to the original impression the clearer will be the memory image. The following example is given by one student: "If I am introduced to a person I have never seen before, in order that I may know him when I meet him again, I must give my attention to his general appearance, features, and so on."

Attention to the association of ideas helps in the future recall of those ideas. For example, suppose one desires to remember the definition for a decimal fraction. Full attention must be given while learning it and the associated ideas noted. Then, when using the definition, if it is difficult to recall, attention should be given to the train of thought of which that definition is a part.

### *Attention and Habit*

Almost all our habits develop because of attention being given to some particular action. After attention has been given to the action a sufficient number of times it becomes unnecessary and we perform the act mechanically.

The forming of some habits requires a great deal of attention as well as will power and the same is true in breaking a habit. However, in the latter case attention to a habit which is to replace the undesirable one is more effective.

### *Attention and Imagination*

Imagination is also closely related to attention. It is usually impossible to imagine, or in other words to have a clear mental picture of, any scene if we have not at some time given attention to details similar to those which appear in the scene to be imaged. If we wish to picture the appearance of some chivalrous knight of the Middle Ages, we must make use of various facts concerning knights which we have learned in the past.

This is, of course, similar to the use of attention in memory, the difference lying in the fact that in imagination the images are not reproduced exactly as they were when we first gave them our attention, but are now arranged as our fancy chooses and as we are able to control and direct the attention.

*Attention and Interest*

Interest is certainly closely related to attention and knowledge is the result. We are more apt to listen to a lecture which is interesting than one that is uninteresting. Often something a little odd or new will gain the attention. One student gives an incident which happened in her home town. "A whole store window was covered with advertisements except a small hole three inches in diameter, and on the curtain was written, 'Please do not look.' Every one who went by stopped to look through. The window contained a large card with a display of gentlemen's collars hung on a peg and above was written, 'Rubber! Collars.'"

The lover of nature observes the habits of his bird friends and because of his attention he discovers the law of protective coloration. The astronomer watches the heavens and is able to announce to the world the discovery of a new star. So it is throughout the whole list of these knowledge-seekers; physicists, chemists, geologists, all owe their knowledge to the concentration of their attention on their chosen subject. It often seems as though their discoveries were made by chance, but brief consideration will show us that attention was the essential factor.

It is a well-known fact that most people, especially children, attend to the things that are interesting. Therefore in school, lessons should be made as attractive as possible in order that useful things may be attended to and learned.

*Attention and Sensation*

Increased intensity of sensation draws the attention. On the other hand, attention directed to a sensation increases its intensity or at least its clearness in consciousness. Many sensations lie in consciousness almost unfelt when the attention is busy elsewhere; as soon as thought is directed to them,

they are given full force. By fixing the attention upon burns, bruises, etc., the pain is increased. That is why we try to divert the mind of a patient we are caring for from his particular trouble.

### *Attention and Movement*

The relation of movement and attention is exceedingly close. We notice reflexly the person, bird or squirrel that moves anywhere within our range of vision. Lines being drawn in a picture attract more notice than those already drawn. If the movements are made by one's self attention is still more easily held. The movements of the eyes are very closely related to attention. It is hard to look at one object and attend to another. Our attitudes and expression of face produced by slight muscular movements show others whether we are attentive or not and also help in making the proper mental adjustment for attention. When one's thought wanders it can often be concentrated by straightening up and making some muscles tense.

### *Attention and Will-power*

Strong will-power is one of the essentials of good voluntary attention. If one has strong will-power he can keep his mind upon the most uninteresting things. Weak will-power means poor attention except to things that force themselves upon the notice. On the other hand, what we do is the result of attending to certain ideas and purposes, hence only he who can direct his attention can exercise will-power in carrying out what has been undertaken. To be successful in any profession one must not reflexly attend to whatever attracts or impresses him but must voluntarily keep his mind upon what helps in gaining his purposes.



## LAWS OF ATTENTION

Attention, like most things, is governed by laws. From observation and reading one may find a great number of laws of attention, but only the most important ones will be taken up in this topic. Other things being equal, the following laws hold true.

(1) The strongest stimulus attracts the attention, or in other words the attention depends upon the intensity of the stimulus. This is true not only of hearing but also of sight, taste, and smell. Our attention is attracted by a loud sound, by bright colors, by bitter and sweet tastes, and by strong odors, all because of their intensity.

(2) The more rapid the change in the stimulus the greater the degree of attention aroused. At a moving picture performance scarcely any one is seen turning around but every one's attention is held by the rapid transition from one picture to another. If we are in a very warm atmosphere and it suddenly grows very cold, our notice is instantly attracted. If the change took place gradually it would not be noticed as readily.

(3) Physiological laws govern attention as well as laws of external stimuli. A person who is tired or not physically strong cannot give as good attention as an unwearied or healthy person. The physical condition of a person also leads his attention along certain lines. For example, an invalid is attracted by advertisements relating to medicines, but a well person rarely notices them.

(4) There are several mental laws influencing attention. One easily attends to things that have been attended to recently or frequently, and to whatever is related to something that has been agreeable. The power of an object to attract one's attention is largely dependent upon one's interest. If we are not interested in a thing we find it very

difficult to pay attention to it, and we must know something about a subject in order to be interested in it. If we go to a lecture on planets and are wholly ignorant of the subject of astronomy, we will find our mind on anything but what the lecturer is saying. On the other hand, if we have just been studying about the planets and are interested in them, the results of the lecture will be far different. Hence knowledge always helps in attending to any new thing that can be connected with it.

A knowledge of all these laws is of great value to teachers and others who wish to find the best way of gaining and holding attention.

#### CONDITIONS AFFECTING ATTENTION

The conditions affecting attention are: physiological, mental conditions and surroundings or environment.

The state of the brain and nervous system, as well as the quantity and quality of stimulus received from an object, affects attention a great deal both in regard to the amount of effort required to give it and the length of time it can be sustained.

Let us first consider how mental conditions affect attention. A good lawyer is able to so concentrate his mind upon the testimonies of plaintiff, defendant and witnesses, that in the summing up he can use all the evidence with the greatest effect, perhaps moving his hearers to their profoundest depths and perhaps persuading the jurors to decide an important case in his favor. Such a person is in full command of his mental powers.

Let us see how physiological conditions affect attention. Children in the school-room become inattentive if they are not physically comfortable. School children should wear well-fitted clothing else they become restless and irritable.

If they are fatigued they cannot give good attention to study.

The surroundings or environment are also important. Great care should be exercised in looking after the ventilation of a school-room. Impure air produces drowsiness by causing the brain to become stupefied. Improvement in scholarship will be seen if all such disturbing influences are removed or avoided.

The temperature of the room has much to do with one's capacity to attend. The air of the room should be changed as many times as possible during the day and it should be moist. The thermometer should never register above  $67^{\circ}$  or  $68^{\circ}$ , for it has been proved by many experiments that such a temperature is conducive to the best mental activity.

The weather also has something to do with attention. On a stormy or even a cloudy day, when everything outside seems dull and unpleasant, children are apt to bring this feeling into the school-room.

When a person is endeavoring to place his thoughts upon paper, they become in a measure dispelled if a conversation is begun in his hearing. The average person cannot help listening to what is said in his presence. He may continue his writing but it is impossible for him to do his best at such a time, especially if he is not thoroughly interested in his subject.

Hounds on a fox hunt at night attract attention. A rooster, when he crows in the late evening, is apt to be heard, while if he crows in the early morning, such is not the case. All unusual sounds, sudden cessation of sound, unusual sights, odors, tastes and unfamiliar movements tend to attract the attention of any one who experiences them.

Teachers should be familiar with all the conditions as far as possible, that they may be able to help their pupils to

overcome the many hindrances which constantly appear, and to strive toward greater success.

#### HOW TO SECURE AND HOLD THE ATTENTION

Of the many places where attention is absolutely necessary, the school-room is one of the most important. Nothing can be taught unless the pupils are paying attention. Here lies the chance for the teacher to show her originality, and she should use it in making the lessons varied and in conducting them in different ways, thus keeping the children's interest alive and not letting the work become monotonous.

Variety is the key-note in obtaining and holding the pupils' attention. If this fact were borne in mind, teachers would have few inattentive children.

Connection should always be made, when possible, between the subject in hand and something in the children's lives, for this will arouse interest. It is similar to meeting new people and becoming suddenly interested in them if they mention some one we know. What a different feeling comes over us and how much deeper interest we feel in them. It is the same with stories either of history or fiction. When a story is told us in which a certain character or place which we have heard of before is mentioned, we connect the new with what we already know and find our interest increasing.

In teaching about Japan, a comparison may be made between the habits and customs of Japan and our own country. When taking up taxes with the children, have them find out all they can about the taxes their fathers have to pay. This will lead their interest to "those dry old examples in the book."

Children are always interested in objects. Pictures also

help to correlate the new with the already familiar. For instance, if the lesson is on cotton, pictures of cotton and cotton fields may be shown, also pictures of Eli Whitney's cotton gin. These may be used together with the real cotton and cotton seed, or in place of them, when they cannot be had.

In teaching arithmetic, bring in the names of animals which interest the boys, and flowers which interest the girls. When the weather is disagreeable it is well not to give the more difficult lessons but to keep them for a brighter and more cheerful day.

The teacher should train herself to see that the temperature and ventilation of the room are as they should be.

Children become tired if they are compelled to sit too long in the same position. A short gymnastic exercise will arouse their spirits and also their interest in their work. Pupils should not be allowed to lounge in their seats, for when the muscles are relaxed, the child cannot work, any more than a horse, with his muscles relaxed, can draw a load uphill.

Children soon become tired of looking at the same things for any length of time. The teacher should remember this when she places pictures or ornaments around the room and allows them to remain there for months at a time. There are some qualities in a teacher which assist in securing and holding attention, and there are others which hinder. A teacher's personal appearance should be as neat and attractive as possible, for the respect of the children is lessened if she dresses untidily. If she wears the same dress all the time, the children will soon become tired of looking at her. This is a serious matter, because the teacher must be before the eyes of the pupils for about five hours every day. One little boy said that he knew when the teacher received her

pay because she always came to school the next week with a new tie or belt. The voice and manner help, too, in gaining attention. A teacher should not speak in a loud voice all the time, neither should her tone be dull or monotonous. No teacher can arouse interest in a subject in which she herself is not interested. It is hard to be enthusiastic over anything unless one is well. Therefore a teacher needs good health.

Questions should always be asked before the pupil is called upon to recite. This requires attention from every one. A whole class will be kept alert if the questions are not asked of the pupils up and down the rows in order. This keeps every child in suspense until some name is called.

When one has secured attention she should reward it by giving something worth while, else she will be like the boy who cried "wolf" in the fable. He secured attention at first, but there was nothing to his story. Soon he could not make any one listen to him, even when there really was a wolf destroying his flock.

If the teacher correlates the new with the old, uses her originality and appeals to the curiosity of the pupils, she will arouse their interest. If she then keeps it from lagging by introducing variety, she will have solved the difficult problem of securing and holding attention.

#### DEVELOPMENT OF ATTENTION

The development of attention is shown in the change from involuntary to voluntary attention, or will-power. Attention in infancy is altogether involuntary. As the child becomes older, we see the voluntary type developed. An infant is first attracted by powerful stimuli, such as a bright red tie or a rap on the door. As he grows older, less powerful stimuli attract his attention:—footsteps that fall softly,

or a color which is less bright.

When a child begins to look a long time at a certain thing, he is doing what favors the development of voluntary attention. An example is given by a student as follows: "Not long ago I visited a friend who has a baby four months old. I wore a dark blue tie and a white shirt-waist with a dark skirt. The baby fastened its eyes on my tie and would not take them from it for a long time. We tried to attract its attention to other things but it took several minutes to do this." Such attention is made stronger and more voluntary by using it. Soon the child is able to fix its attention on an object for a longer time and the stimuli will not have to be so powerful. A child whom one of the students had an opportunity to observe, wanted his mother to come and get him. He cried very loudly at first, then whined awhile, and finally stopped and listened to the loud ticking of a clock which was in the room, then started to cry again, but stopped to listen to the ticking of the clock and to see the pendulum move.

The power of voluntary attention has not become very great when the child enters school. Nevertheless it may be applied for periods of ten minutes at a time and, with practice, for longer periods and to less interesting things.

In the development of attention the following are necessary: variety, interest and novelty.

The child's mind tires in a short while and his attention becomes wavering. For this reason variety is an important factor in holding the attention of small children. For instance, if one sees that at the end of the arithmetic lesson the attention is poor, introduce a singing lesson and see how quickly interest is again aroused. When attention through the sense of hearing has become lax, appeal to the sense of sight. If the pupils' thoughts begin to wander from the

lesson and they become restless, a little physical exercise helps.

Much care must be taken to have a suitable environment in school. If a child becomes uneasy or nervous, the chances are that the class room is either too hot or is badly ventilated.

With small children the element of interest should be continually kept in view in teaching a lesson. To gain attention is not to hold it, and the latter is more difficult. Attention is never secured by demanding it. Punishments compelling the outward semblance of attention are of little value because the child has not developed sufficient will-power to bring his mind to bear upon the subject and the point of contact must be found between the subject and the child's interest. Too often a child has the mere appearance of attention. The teacher must lead the child to voluntary attention by appealing to his involuntary attention. This shows why lessons for young children should be interesting.

By the time the child is in the intermediate grades his attention is quite well developed and is largely voluntary. The pupil intentionally attends in order to accomplish some purpose. It is essential at this period that the pupils should recognize the value of voluntary attention and learn to study.

When a student reaches the high school he should be able to give determined attention. Concentration upon one thing for several hours at a time should now be possible. If the attention is not well trained at this period, it never can be utilized to any great extent in after life.

One may develop his own power of attention by spending a little longer time on some subject each day. It shows a weakness of will-power when one spends only an hour on a subject and then feels that he must change and do something



else.

Power of attention should develop with age until maturity, and this development depends largely on the individual himself. Attention should be developed along the right lines. Some one has said, "We do not pay attention to the things which do not interest us but we are interested in the things to which we give our attention." If this is so, we can choose for ourselves what we shall be interested in, and along what lines we shall develop our attention.

## V

### CONCEPTS

#### NATURE OF CONCEPTS

**A**CCORDING to Sully, "A concept is a representation in our minds answering to a general name." A concept may be defined as a general notion, a class notion, or a group notion. If some one should say "book" to you, you would probably not think of any particular book, but rather of the general meaning of the word, covers, leaves fastened together, and printed matter. In other words, you would have a concept of "book." The word "knife" generally calls to mind a sharp instrument, consisting of a thin blade of steel fastened to a handle.

The following illustration of a change in a concept was given by a member of our class: "In our back yard there was a plum tree which bore purple plums and I thought that all plums were of the same color. One day, a visitor brought me yellow plums, but I refused to eat them, declaring that they were lemons. At last I was persuaded to taste them, and by their flavor I knew them to be plums. Later I found that there were also red plums. Now upon hearing the word 'plum,' I do not think of any particular variety, but of plums as a class, their size, shape, flavor, etc."

In another instance a small boy first saw a house elevator that was worked by hand. When he heard an elevator mentioned, he immediately thought of that particular one. Afterwards, he went into a department store and saw an ele-

vator which was worked by a lever. At different times he saw other elevators, one for carrying freight, others for taking passengers to different floors in the store. Thus, his first narrow idea of an elevator became broader and more general. Now, when an elevator is mentioned, he thinks of it simply as a means of conveyance from one floor to another.

A certain teacher gave the term "relief map" to a class. Upon questioning, she found that a part of the class glanced at the relief map in the room, others formed a mental picture of the relief map of the continent they had been studying, while the remainder formulated a definition of the term.

In analyzing this, we find that in the first case the thinking was presentative and that the pupils had a percept of a particular map. In the second case, the thinking was representative, *i. e.*, images of maps which they were studying were re-presented in their minds. In the third case, the pupils formulated a definition from their knowledge of the general characteristics of a relief map, without perceiving or imaging any individual map. This shows the difference between percepts and concepts, and mental images and concepts.

### *The Difference Between Percepts and Concepts*

Percepts involve use of the senses and give knowledge of things present while concepts imply knowledge about classes of things. A person looks at the Washington elm. The use of the sense of sight is involved, and he gains a percept of that particular elm. This same person reads an article on elms. No particular tree is described, but the common characteristics of the class are noted; hence he gains a general notion or concept of elm trees.

Two girls were walking along the street, when one of them

said, "Look at the rat trap in that store window." Her companion looked and obtained a percept of a rat trap. Later when a little child asked her what a rat trap was she immediately called to mind her knowledge of rat traps so as to give the child a general notion of the way they work and what they look like and thus she gave him something of the same concept she had obtained through perception.

### *Mental Images and Concepts*

It is often difficult to distinguish between mental images and concepts, since both are re-presentations. A mental image is a "picture" implying remembrance of a particular thing, while a concept is a general notion suggesting knowledge of classes of things. For instance, if we had experienced an earthquake and were asked to describe it, an image of our experience would come before us and we should have no difficulty. This would be called a mental image. On the other hand, if we were asked the meaning of the word "earthquake" we would undoubtedly think of everything we had ever heard connected with the word, and then, arranging these thoughts in proper order, tell all we knew about an earthquake. Thus we should give a definition which would be our concept of that phenomenon.

A boy sees moving pictures on "Coal Mining." These pictures show all the details of the industry. Later, the subject is taken up in class. Instantly the child recalls the pictures he has previously seen, his mental images of this industry. After visiting or hearing of many mines he may not recall a distinct image of any one of them but whether he does or not he has a good concept of what they are.

### *Kinds of Concepts*

Concepts may be divided into two groups: those referring

to a class of objects or *class* concepts, and those which signify a quality, or abstract concepts. Examples of the first are ship, house, flower, dog, etc. Examples of the second are mercy, beauty, alertness, sweetness, etc.

When I speak the word "ship," you immediately think of ships in general as distinct from houses, flowers, etc., or to go back to the definition, in forming this concept we separate this class of objects from all other classes. We are, in a word, classifying.

On the other hand, when we hear the word "mercy" we do not try to think of one class of objects as distinct from all others, because mercy is not an object but an abstract word, and the only distinction made is to separate one quality from all other qualities.

It will be noticed that all abstract or qualitative words indicate abstract concepts. However, we have more or less abstract concepts of concrete things. Anything may be thought in abstract form. The fewer and less prominent our images of specific trees or of special varieties, when we hear, see or use the word tree, and the more we think of their nature as different from that of vegetables, vines and other classes of things, the more abstract is our concept.

### *Ways of Thinking Concepts*

There are two ways of thinking concepts, in extent and in intent. Thinking in extent is the application of one word to many objects, or the grouping together of all that belong in a class. For example, under quadrilateral may be grouped everything that has the form of a parallelogram, such as a rectangle, square, rhombus, rhomboid or trapezoid. Under furniture, we think of chairs, tables, pianos, book-cases, etc. Under building we may group school, library, house, barn, etc.

Thinking in intent is recalling general qualities belonging to an object, selecting the characteristics that distinguish it from other classes. A quadrilateral is a plane figure having four sides. Furniture is whatever is added to the interior of a house for use and convenience. A building is a more or less permanent structure designed for shelter.

In extent the concept chair includes dining chairs, rocking chairs, wicker chairs, upholstered chairs, etc. This is grouping all we can under the class name, or thinking in extent. From another point of view a chair is a movable seat which has a back. This is thinking in intent or grouping and relating abstract qualities.

There is a definite relation between the extent and the intent of a term. The greater the extent the less the intent, and vice versa. Take the case of quadrilateral. Many figures may be grouped under the head of quadrilateral, that is, the extent is great. Yet the distinguishing general qualities are few. A quadrilateral is a plane figure having four sides. The intent is small.

In illustration of the opposite condition take the term square. The extent is very limited, including only figures of the same shape but varying sizes; whereas the intent is much greater than in the case of the quadrilateral. A square is a plane figure having four *equal* sides and four *right* angles.

### *Summary*

In summing up the nature of concepts we find any general idea which we have gained of anything is a concept.

A concept differs from a percept, first, because a percept is particular, while a concept is general; secondly, a percept involves the use of one or more of our senses, whereas a concept has no immediate connection with the senses. It implies a general knowledge of things which may have, in the

beginning, sprung from percepts but which has now grown from a particular into a general idea.

A mental image means a particular picture, while a concept is the product of a great many mental images so thoroughly mixed that the outline of any one is indefinite, yet the whole mass, as a general notion, is clearly distinct from every other mass.

A concept is in either one of two divisions, class or abstract. We have a class concept when we are able to distinguish one class of objects from all other classes. We have an abstract concept in connection with words which represent a quality or a group of related qualities.

We may think our concepts in extent and in intent. Thinking in extent involves the application of one name to many objects. Thinking in intent is selecting the specific qualities belonging to a class of objects. The law governing their relation is, the greater the extent, the less the intent, and vice versa.

#### FORMATION OF CONCEPTS INCIDENTLY

Under the preceding topic, "Nature of Concepts," we find that thinking is dependent upon concepts. There is an important distinction between concept and conception, the latter often erroneously used in place of the former. Conception is the act of forming a concept; therefore a concept is the result, conception the process.

Concepts are formed by means of:

- 1 — Percepts.
- 2 — Mental images.
- 3 — Other concepts.

Concepts being general and abstract are based upon percepts which are individual and concrete. To perceive we must use one or more of our senses. The percept "bird,"

gained through sight, might mean the little canary in a gilded cage hanging in the room, while the usual concept "bird" would be an animal which has feathers and can fly, regardless of color and size. A child sees goldfish in his home aquarium. Later he sees fish bought to eat, even catches small ones himself. His visual percepts develop a concept of "fish" as a creature of different colors and sizes, inhabiting the water and used for food.

Another child may hear a piano at home, in the theater, or at school, and form a concept of the sound of a piano through his auditory percepts. A child may smell of different kinds of perfumes and gain a concept of perfumery by his sense of smell. He may prick himself with a needle and after feeling of other pointed objects, will conceive through his sense of touch that all sharp pointed instruments prick. Children eat sugar, custards, cakes, ice cream, and through their taste percepts form a concept of sweet.

We very readily form concepts of remote things through mental images, if words are so used that mental pictures corresponding to the percept of the objects are brought to our minds. Comparatively few people ever see an iceberg, but many have a concept through percepts of ice, mountains, etc.; similarly with *aëroplane*, prairie, and desert. Any one knows what sand looks like and from the mental picture can imagine a large, barren tract of sand as a desert.

The third way of forming concepts, namely, through other concepts, is illustrated thus: a person having no idea of a flamingo finds in the dictionary that it is a bird as large as a stork, and is scarlet. By combining his former concepts of stork and scarlet, he forms the new concept of flamingo. The process used in adjusting these ideas is conception and the result is a concept.

By describing a volcano using the words "mountain,"



“smoke,” “rumbling,” “lava,” etc., we can cause a child unfamiliar with the term to form a new concept. A child asks what a grape-fruit is, and is told it is a fruit a little larger than an orange and light yellow in color. His new concept is based upon his knowledge of the familiar words used and thus his concept is formed through words.

### *Development of Concepts*

In the formation of concepts there are successive stages: observation, comparison, abstraction, and generalization.

Observation supplies a percept or image of two or more things resembling one another, as a “crow” and a “robin.” Comparison naturally follows and the child discovers that a crow and robin have the same characteristics, feathers and wings. Comparison, then, is always essential in forming concepts. Abstraction is the result of especial attention paid to the similarities noted in comparing the percepts or images. The concept is formed from the qualities common to all members of the class, disregarding those belonging only to some of the class, size, color, etc.

Generalization is that stage in which the child reaches the idea of the essential qualities of the class and consciously affirms the truth, “birds have feathers, two legs, etc.” The idea of the child in the preceding instance would be the concept “bird.” But if he thought of “red-breasted” it would recall the robin. This would be a special quality not pertaining to the whole class. In order to generalize, one must group objects into classes according to a few characteristics common to all individuals of the class.

### *Concepts Formed and Changed*

While concepts are being formed, they undergo partial and often complete changes. They alter with the growth

of judgment and reason, and with each new experience in seeing the objects previously classified.

A small child was walking on the streets with her mother. They passed a man with a beard. The child having seen the picture of "The Christ" at home, said to her mother, "Mamma, is that God?" Because her concept of God was a man with a beard, she thought any man possessing one was God. Aside from being incorrect this child's concept was formed incidentally or through experience.

A small boy saw a cat's tail moving, and followed his impulse to catch it. The cat, of course, scratched him. He never tried to pull its tail again. His concept of cats had been changed.

These incidental concepts are formed unconsciously. We do not think of them until, at some time, we use the truth or knowledge thus stored away. The following is an example of a concept corrected by experience. A little boy thought five pennies, or even two or three pennies, of more value than one nickel. His concept of value was based on the number and not on worth. One day he went to the store with three pennies to spend. His brother, having a nickel, bought the same kind of candy as the younger, but, of course, received more. Through his experience, the child finally got the concept that the greatest number of pieces of money does not necessarily buy the most.

A grape-vine grew near a child's house. One day she tasted of the grapes before they were ripe and naturally the fruit was sour. Later, when the grapes were blue, she tasted them and found them sweet. She concluded that green grapes are always sour and blue ones sweet. Later, when her mother offered her some white grapes (which looked green) she refused them, saying that they were sour. It was a long time before her incidentally formed concept

was changed.

Although concepts may be formed through experience without conscious effort, we may form them intentionally, that is, with that purpose in mind. A boy had heard the words "aëroplane" and "aviation" used. He had a vague concept of their meanings. Finally in a reference book he discovered the more complete meanings of the terms, thereby forming new concepts based on old ones. Later he witnessed several exhibitions given by professionals, and, by studying their machines, was able to construct one for himself. He had then formed a complete concept of an aëroplane through conscious or intentional effort.

### *Correct and Incorrect Concepts*

Both correct and incorrect concepts are often modified. A concept already formed grows through the acquisition of new ideas. One person had a concept that fuel was always wood. In visiting friends, she learned that coal and gas were used. Later her concept was modified by the knowledge that electricity is employed for a similar purpose.

A girl thought that "text" meant a verse from the Bible. In grammar school the teacher spoke of "text" books. Here the concept expanded. In both examples the concepts were correct as far as they went but needed modification as regards definiteness and accuracy.

Incorrect concepts must sometimes be completely changed. A young lady supposed that there was an animal, all the meat of which was called "corned beef." At school, where cooking was taught, she soon discovered her error. A girl was asked to illustrate a story or poem about a window. She saw the title, "The Land of Counterpane," and said, "That will be a good poem to illustrate; it must be something about a window." She had never heard the covering

of a bed called a counterpane, and she concluded that it meant a new kind of pane in a window. In this case her concept was incorrect, although she founded it on the familiar word "pane."

A little boy who had never seen a real pig formed his concept from the story of the "Three Little Pigs." He thought that a pig was about the size of a cat, walked on his hind legs, and carried a basket. One day when in the country he saw an animal larger than a cat called a "pig." This was the first modification of his incorrect concept. Then he saw it walk on all fours, and thought the pig had fallen down and was crawling, as he had sometimes done. Another difference was that the pig carried no basket. Thus the child's original concept was entirely incorrect.

In geography the North Pole to many children means a material object, since their concept of a "pole" is a tree minus its branches. Similarly, children believe the equator to be a red hot line around the center of the earth.

### *Degree of Definiteness*

Our concepts vary in their degree of definiteness: The first degree implies ability to distinguish one class of objects from another, or to know what kind of an object is suggested by a word. Possessing concepts of the second degree one is able to name particular characteristics of certain objects. If his concept is of the third degree he can name the larger group to which it belongs and the characteristics common to all objects of that class and that distinguish it from any other class. In the first case the concept is vague, in the second it is more definite, in the third scientifically accurate. A person asks the meaning of "consequence." One person has an indefinite idea of its meaning, another uses it correctly but cannot tell the exact meaning, while

still another can use it and give a perfect definition of its meaning.

“Mongolian” may suggest a race of people as distinct from the Caucasian or Malay. If the concept is of the second degree of definiteness, a person may name the Chinese as Mongolians because they have yellow skin and black hair. A concept of the third degree would be an accurate definition as “members of the Mongol race inhabiting Mongolia, between China and Siberia; the name frequently given to Chinese and all yellow people of Asia.”

### *Relation of Concepts to Reasoning*

All reasoning requires concepts, but concepts develop without reasoning if they grow in our minds unconsciously and incidentally.

We have a concept of a pencil without ever consciously reasoning how or why it differs from any other object. A man finds that rats infest his barn and eat his grain. He knows that rats like sunflower seeds, so he sets a trap containing a quantity of them, and meets with successful results. He reasons that if a rat likes sunflower seeds, a trap baited with them will catch the rats. He could not have reasoned without concepts. He must have had concepts of the words “like” and “sunflower seed.”

There are two forms of reasoning, inductive and deductive, and concepts are closely connected with both forms.

### *Induction*

Induction is the process of forming a general truth from particular instances. We begin with cases included in our experience and generalize beyond it.

Cork, which is lighter than an equal volume of water, floats on water. Ivory soap, which is lighter than water, floats;

so does a leaf or piece of wood, each of which is lighter than an equal volume of water. Reasoning thus step by step, we finally formulate the general truth that anything which is lighter than water will float.

A teacher wishes to show that electricity may be produced by friction. She takes a rubber comb, rubs it with a piece of flannel, applies it to a needle. It attracts the needle. Evidently the comb has been electrified. She then goes through the same process with a piece of glass tubing and a piece of silk, with the same result. The glass tubing has been electrified by friction. She may make several similar experiments and the pupils infer from these the general truth, electricity may be produced by friction.

### *Deduction*

Deduction is the exact opposite of induction. In deduction we apply the general truth to particular cases.

The general statement is given, "the nearer the equator, the hotter the climate." Therefore, Mexico must be hot because it is near the equator; Alaska must be very cold because it is far from the equator and near the North Pole; the United States, being half-way between the pole and equator, must have a medium temperature.

A teacher gives the definition, a noun is a name. The pupils apply this truth to examples found in sentences. In the sentence, "The horse is white," horse is a name, therefore it is a noun. This is an example of deductive reasoning.

### *Development of Concepts with the Development of Language*

Perception can take place without speech, but language is necessary in forming definite concepts. In order to have well-developed concepts, a person must be accurate in his

language, for true concepts depend upon a correct and thorough understanding of words. Nevertheless, we cannot say that a child not able to talk has no concepts, for he may have a very crude sort. An infant's mind is more concerned with sensations than with concepts, because the small child thinks of things in particular rather than in general. He realizes the distinction between animate and inanimate objects, that is, he classifies them, though very incompletely, as living or not living. Such concepts may be formed without language.

A child may form class ideas before the class name is familiar to him. For instance, his dog is named Rover. The dog is merely Rover to the child; he has never heard the name dog mentioned. He sees other dogs and classifies them in his own mind, distinguishing them from people, horses, etc., even if he does not know the class name, dog.

The first words and concepts of children are acquired in connection with objects and experiences. The first few words aid in learning new words and forming new concepts. At first a child's knowledge of the meaning of a word is very narrow, consequently his concept will be very incomplete.

A child often knows a word by sound but has no corresponding concept; and sometimes he may not be able to speak a word, but still have a correct concept of it. This is best illustrated in reciting poetry. Children may know the words but perhaps have no idea of the meaning. A child in reciting "The Children's Hour" pronounced the word "banditti" correctly but had no concept, while at another time she mispronounced "occupation," although she had the correct concept of it. A whole class was talking about cross-pollination of flowers by bees, and none of them even knew what pollen was.

After enough separate concepts have been acquired the

child puts them together to form a sentence. It is in the formation of sentences that words are liable to be used incorrectly because of wrong concepts. A girl said that the city was going to have a hyperdermic of measles, instead of an epidemic. A boy on being asked what a certain teacher taught at school said, "She gives execution lessons," meaning elocution lessons.

These instances show how necessary it is for a person to have a clear, definite idea of the meaning of a word before he can use it correctly.

#### JUDGMENT AND REASONING

In perception we form single ideas; in concepts, general ideas. In judging we compare the single or general ideas to find the relationship between them. Judging requires comparison and decision. "To judge is to assert an agreement or disagreement between two ideas." A judgment, then, is the result of judging. Judgments precede speech. When a child says, "The bread is dood" (good) he has gone through a process of judging. He thought "dood" first, then said it, later "bread dood," then "The bread is dood." The sentence is an expression of a judgment.

Reasoning requires at least three judgments. It may be defined thus: reasoning is perceiving relation between judgments. We see two things with a few similar characteristics; a certain statement is true of one of them, then it must be true of both.

"This water spaniel can swim"; "Other water spaniels are like him." "Hence all water spaniels can swim," or, in another form of reasoning, the general truth, "All water spaniels can swim," is used as a premise; next, "This dog is a water spaniel" is given as the particular truth, followed by the conclusion, "Therefore he can swim."



*Summary*

Concepts are formed through percepts, mental images, and other concepts.

In forming concepts the mind must pass through four successive stages: observation, by which the person notices two or more things resembling one another; comparison, in which he compares images or percepts, noticing especially the similar qualities; abstraction, whereby the similar qualities are viewed separately; generalization, in which he groups things having similar qualities and thus forms a concept.

While concepts are being perfected they go through partial or complete changes by means of incidental experiences and by intentional efforts. A true concept already formed may be enlarged through addition of new ideas. An untrue concept is often completely changed with the acquisition of new knowledge.

There are three degrees of definiteness in concepts. Those of the first degree are indefinite or vague; of the second, more complete; third, scientifically accurate.

All reasoning must make use of concepts. There are two kinds of reasoning — inductive and deductive. By inductive reasoning we apply a general truth to particular facts.

We must have a clear, thorough understanding of words and their uses in order to form concepts. Judgments result from comparing single or general ideas to find the relation between them. Reasoning is perceiving relations between judgments.

## FORMATION OF CONCEPTS THROUGH TEACHING

*How to Help Children to Form Concepts*

A child begins to form concepts when but a few months old, and continues the process as long as he lives. In early life he does this incidentally and unconsciously. For exam-

ple, he soon finds out that people move about and inanimate objects do not. When a year or so old, a child has begun to learn truths regarding the law of gravity, but he has not generalized them. As soon as he begins to sit up he learns that, unless he is careful, gravity pulls him over. He knows that if he puts things over the edge of the table they will fall. He has never thought much about it, but he shows by his actions that he knows that unsupported bodies fall.

A child is continually making his own simple inductions. For example, the general name "house" suggests to the child's mind only the house in which he lives. After a while he learns incidentally that "house" refers not only to his own home, but to all his friends' homes and, finally, to every structure in which people may live. Again, circumstances cause him to notice that a cube will stand firmly and a ball will not. These concrete situations prepare the way for generalizations that may be used in reasoning.

After the age of six, the child gets concepts more consciously. Then the best way of helping him to gain concepts is through inductive teaching, that is, leading him to derive general laws or truths from particular facts, aided by words that call to his mind images and concepts already familiar to him. As the child advances, he makes larger and more logical inductions, thereby gaining broader and more accurate truths.

The essentials of gaining new concepts by the inductive method are as follows:

- 1 — A clear idea of the aim.
- 2 — A sufficient number of related individual facts.
- 3 — Their arrangement in such a way as to make the general idea evident.
- 4 — Application of the truth gained, by which the concept becomes more accurate.

*The Formal Steps in Teaching*

The formal steps in teaching children new general truths are these:

- 1 — Preparation — Statement of aim and recalling of knowledge already possessed.
- 2 — Presentation of new material.
- 3 — Comparison.
- 4 — Generalization.
- 5 — Application.

The purpose of stating the aim is to arouse interest; therefore it should leave some question in the child's mind which will make him wish to learn the answer and know more about the subject. The teacher may have as an aim the gaining of a certain concept, but state a simpler one to the class. For example, the teacher may wish to teach the truth that multiplying the numerator and denominator of a fraction by the same number does not change the value of the fraction. She need not give this aim to the children, but might say, "I am going to show you a little trick so you may be like little magicians when you want to make fractions do as you want them to do."

In the preparatory step, as many ideas as possible, related to the subject in hand and useful as regards the aim, should be called up. This familiar knowledge is the foundation upon which to build the new, for the child is incapable of forming new concepts, inductively, unless his mind is prepared. For example, preparation for teaching of the pronoun would be a review of the noun.

In the presentation of the lesson, representative particular facts should be given or suggested to the class, so arranged as to make the goal toward which the teacher is working, plain to the children. For example, "What ques-

tions have you heard people ask of the information man at the depot?" "When does the train go?" "Write 'when' on the board." "What other questions have you heard?" "Where does the train go?" "Write 'where' on the board." "How may I get to Boston?" "Write 'how' on the board." The children are thus made ready to study adverbs and supplied with material for comparison and generalization.

In the comparison, we should dwell only on likeness and contrast in leading up to the general truth.

In this statement, "The greater the struggle for existence, the sharper the wits," we could compare the life and characteristics of the fox with those of the woodchuck or porcupine.

After studying the particular facts presented, the pupil should be able to grasp the general law and state it clearly. The definite statement of the general truth prevents vagueness of thought and serves to fix it in the minds of the children. This step is called generalization.

Each step of the inductive lesson should be understood before the next is taken up. The application or the applying of the general truth comes under deduction, although it helps complete the process of induction.

The best way to get children to form concepts is by inductive and deductive lessons. These two, however, are not the only kinds of lessons used in the schoolroom. There are many others which are essential; for instance, the recitation, drill, review, and test lessons.

### *Inductive Lessons*

The following may be taken as examples of inductive lessons: Lesson (1) Teacher's aim — To teach the three things which promote a city's growth along commercial lines.

**Preparation:** Call up previous knowledge of New York City. **Statement of aim:** We are going to learn what makes New York such a large city. Show pictures of New York harbor, etc.

**Presentation** — Each child should open his book to the map of the United States. Locate New York City. Why do the steamers come here? (Large steamers reach New York from all over the world.) Show the class that the hinterland is surrounding country. What is the hinterland of New York? What are the products of this hinterland? Is it a good hinterland then? Name all the water connections of New York City from map observation. Of what use are they to New York City? How could the products of this hinterland be sent to New York City except by water? From the map, tell with how many places New York is connected by rail. Is this an advantage?

**Comparison** — Locate Boston. Is it as large as New York City? Why not? Compare Philadelphia, Baltimore, Fitchburg, and San Diego in the same way, bringing out in each case what accounts for its lack of growth as compared with New York.

**Generalization** — From the lesson, the children should be able to tell what the necessities of a commercial city are:

1 — A good harbor.

2 — A good hinterland.

3 — Good means of transportation.

If the pupil knows how to think inductively, he will be able to formulate these general truths from his knowledge of the subject.

**Lesson (2) Aim** — To teach the receipt.

**Preparation** — Calling up of previous knowledge. What was the last business paper that we learned to make out? A bill. You may each make a bill of only two items. Namé

the different parts of your bill.

Statement of aim — How many of you have ever heard of a person's paying a bill, and then some time later a second demand for the money being made? What was looked for? The receipt. Was it important to find it? Why? To-day we'll learn how to make a receipt.

Presentation — What was the last thing you did to the bill? Receipted it. Why?

Suppose you had received a bill from John Smith for \$8.25. If you took the bill to the store and paid it, what would he do? Receipt it. But if you had left the bill at home and you still wished to pay it, what could John Smith do to show that you had paid him? He might make out a receipt.

How many have ever seen one of these? (Show a receipt blank.) Does any one know what it is called? (If not, tell them.) Now, who can tell me what it is used for? Let us make one on the board. What would you say was the first thing to write? What is written at the beginning of a letter or bill? The heading. What do we put in the heading of a letter? The date, etc. The date of a receipt is of much more importance than the date of a letter, and must always be written.

What was the first thing written when you receipted your bills? "Received payment." We will write something similar to that. Received from John C. Raymond. What was received from John C. Raymond? Then we will put that on the next line. Eight and 25-100 dollars. We will write it out so there can be no mistake about it. Notice the way I have written the cents, 25-100 dollars. Is that correct? Explain. If John C. Raymond were dishonest he might write twenty before the eight. How can we prevent this? (Suggest many ways.)

Is there anything else you would like on your receipt? If J. C. Raymond owed John Smith for groceries and also for a wagon, what would you like written on the receipt? Which bill did he pay the money on? Then on the next line we will write: "For groceries," or "On account of groceries." There are two lines on this blank for those words, so we will draw a line through the unused one.

What is this short line for, down here at the right? Signature. We have completed the receipt now, except for one thing. On this line here in the left hand corner, we will write in figures the amount paid, \$8.25. We now have

FITCHBURG, MASS., Jan. 20, 1913.

Received from John C. Raymond

Eight and .....25-100 Dollars

On account of groceries

\$8.25

JOHN SMITH.

Comparison — Turn to your receipted bills. Tell me as far as you can how the receipted bill is like this receipt. Is it unlike in any way?

Generalization — The first line contains what?

" second " "

" third " "

" fourth and fifth lines contain what?

" sixth line contains what?

When is a receipt given? To whom? By whom? What words must a receipt contain? (To be legal.) What is a receipt?

Application — Suppose that I owed you \$5.25 for merchandise and paid it to-day. Write me a receipt.

This next lesson may be taught either by letting the children do the work themselves, or watching a workman. Lesson (3). Papering a room.

Aim — To teach papering a room.

What part of the room are we going to paper? The sides. Do we paper down to the floor? No. Why not? Because the baseboards go around the room and are about eight inches high. Does anything go at the top of the walls? Yes, either a border or a molding. How wide is a strip of paper? Measure it.  $18\frac{1}{2}$  in. What do you notice on the edges of the paper? There is a  $\frac{1}{4}$ -inch margin on each edge. What is this for? To lap the next strip on, cutting off the edge not needed. Will the strips match anywhere? No, it has to be matched. Do we have any waste in so doing? Show them how this comes about.

How long do you suppose a roll is? Let them guess and then tell them that there are 16 yards, or 48 feet, in a roll.

What should be done about the windows and doors? Show them that, unless there are a great number, it will not be necessary to allow for them. Now that we have the distance around the room and the width of a strip, how shall we find out the number of strips that we need? Divide the distance around the room by the width of the roll. How shall we find out the number of strips in a roll? Divide the length of a roll by the length of a strip. How shall we find the number of rolls that are needed to cover the walls of the room? Divide the number of strips needed by the number of strips in a roll. Always allow for a little waste.

How much shall we allow for a border? Show them that if they allow for one-half width of the border that they will be sure of coming out all right.

How shall we find how much border we need? By finding the distance around the room. How shall we find out the number of rolls we wish if it is 48 feet long? Divide the perimeter of the room by the length of the roll. From the above, the following rules should be obtained:



1. To find the number of rolls for the border, divide the perimeter of the room by 48 feet.

2. To find the number of rolls for the sides, find the perimeter of the room and divide it by 18 inches. Find the height of the room, divide the length of the roll by the height, then divide the number of strips wanted by the number of strips in a roll.

3. To find the cost. Multiply the number of rolls by the cost of a single roll or the number of feet in the rolls by the cost per foot.

### *Summary*

One of the best ways to help children to form concepts is by the inductive method.

The essentials of this method are:

1 — A clear statement of the aim.

2— A sufficient number of related, individual facts.

3 — Their arrangement in such a way as to make the general idea evident.

4 — Application of the truth gained.

Inductive lessons are not in order unless there is a generalization to be made. Applying the generalization is really a process of deduction but it helps in completing the induction by making the truth clearer. The greater the number of particulars considered in reaching the generalization the less need is there for many applications.

## TEACHING THE USE OF CONCEPTS

### *Deduction*

Induction, as has been said, is the primary method by which knowledge is brought to the mind, and the chief source of general truths.

Deduction is the method by which general truths are used

as an aid in gaining new truths. For example, if one knows that all things lighter than water will float he can discover what objects will float without putting them in the water. Deductive reasoning is not necessarily confined to the school room, for children form many of their ideas of things through this method and sometimes reach incorrect conclusions. For instance, a child had been playing with apples and had eaten them. He got the idea that anything which was round was edible. One day he was playing with a ball and tried to eat it. Another little boy who was having his face and hands washed said, "If I was a little brown baby, I wouldn't have to be washed."

When any new subject is taken up by a student he must in some way gain knowledge of the general laws or truths belonging to that branch of learning. This is generally done in part by inductive reasoning before he can use deduction.

In the process of deduction, the need for analysis is as great as in that of induction. In order to know upon what to base the solution of a problem one must have a clear understanding of the problem itself. We know if a child is to learn the climate of a country by the deductive method he must understand the meaning of the word climate and all the things that influence it, then when giving the geographical situation of a country he can make a correct deduction as to what the climate of that country will be.

### *Some Deductive Lessons*

Lesson (1) Influence of Ocean Currents on Climate.

Preparation — Review the general truths as to what influences climate.

Aim — To find out why the climate of Great Britain is warmer than that of Labrador.

Presentation — Take maps and find Labrador. Find Great Britain. Compare latitudes (same). What would we infer, then, of the climates of these two countries? Same. Compare altitudes (same). If the latitudes and altitudes are the same, we would expect the climates to be the same. Note the nearness to ocean (same). Then, if the latitude, altitude, and distance from ocean are the same, what would we expect of the climate of these two countries? What have we in the ocean which influences the climate? Warm and cold ocean currents. What current flows near Labrador? Labrador current. Is it warm or cold? Cold. What is its influence on the climate of Labrador? What current passes Great Britain? Gulf Stream. Kind? Warm. What is its influence on Great Britain? Why, then, is the climate different?

### Lesson (2) Verbs.

General rule — A verb is a word which shows action or asserts.

Presentation — Put the following sentences on the board:

The boy walks to school.

The girl sews.

She opened the box.

The deer runs swiftly.

Have the children notice which words show action or assert and thus decide which are verbs.

Application — Use readers. Give a page and paragraph. Have the children pick out the verbs. Put a list of verbs on the blackboard and have sentences formed containing these verbs.

### Lesson (3) — Metric System.

Preparation — Discuss the English measures, and be certain that the pupils understand the meaning of a standard measure.

Aim — To teach the linear measure of the metric system.

Presentation — This system depends upon the meter which is a certain part of the earth's circumference that is divided into equal parts. The prefixes are taken from the Latin language: mille, meaning a thousand; centum, hundred; decem, ten, giving the prefixes of milli, centi, deci. Factors are formed as follows:

10 millimeters equal 1 centimeter.

10 centimeters equal 1 decimeter.

10 decimeters equal 1 meter.

The multiples are from the Greek:

Deca equals 10; hecta, 100; kilo, 1000.

10 meters equal 1 decameter.

10 decameters equal 1 hectameter.

10 hectameters equal 1 kilometer.

Have the children learn this table. Then comes the most important step, namely, application.

Application — Read 10 cm., 12 dm., 100 m., 10 dm., 10 km., 25 hm., 15,678 km., 18,943 dm., 18,356 dm.

1 meter equals 39.37 inches. Change 15 km. to inches, 10 hm. to inches. (Provide many other such examples.) Change examples in inches to meters, and vice versa, until all are familiar with the use of the table.

The deductive lessons are used to the best advantage in the exact sciences, because those sciences seem to be more easily mastered if the general law is first given and then applied to particular cases, such as a theorem in geometry applied in new propositions and corollaries. The real advantage in deductive lessons is that they give us practice in using our knowledge of general truths. We need more deductive lessons, as will be shown by the following illustration:

Two young ladies were out in front of a building one noon trying to find out which direction was north. One of them

said she knew the shadow which was cast at noon pointed toward the south. If these young ladies had had more deductive lessons they would have immediately applied the general truths which they already knew regarding the direction of the sun's rising and which way it passes through the sky in the northern hemisphere. They could have deducted from these truths that the shadow did not point toward the south, but toward the north.

The disadvantage of deductive lessons is that concepts are formed from other concepts. This sometimes gives ideas which may not be accurate.

### *Summary*

The deductive method of reasoning is not confined to the school room, for very small children gain many of their ideas of things about them by this method of reasoning. The use of concepts may be taught with beneficial results by the deductive lesson. In such a lesson, the pupil is led from general truths to particular facts. In other words, he makes use of his concepts or general truths.

Since numerous concepts and general truths are needed before deductive lessons can be successfully taught, they are not used frequently before the sixth grade.

## VI

### PERCEPTION

#### INTRODUCTION

SO gradually and so naturally does the power of perception come to us that we do not stop to think how wonderful it is until psychology shows us how it develops.

A normal student was once asked to formulate a definition of perception without direct reference to any text book. The proposition confronting her seemed difficult. Her mind was busily engrossed with this problem on her homeward journey from the day's recitations. As she approached the doorstep, her small sister, who was busily engaged in play in the middle of the floor, called out her name. She had recognized her footsteps. On entering the house, the child remarked the muddy condition of her rubbers and asked if it had been raining. Then suddenly she sniffed and ran off to the kitchen to attend to some burning food. The student had been at home just three minutes, and within this time her sister had made a number of observations. The student at once looked upon them as material which might prove helpful as a foundation for her work, and she readily analyzed them. "My footsteps," she said, "were recognized because of previous knowledge of their sound. The fact that I was in the habit of reaching home at the same hour each day, together with the familiar sound of my footsteps, helped my sister to recognize me. Through sight she was able to tell that there had been a recent rainstorm. The sense of smell brought to her mind the fact of a burning

substance." The outgrowth of this analysis was the following definition which proved to be adequate in its nature: "Perception is the act of acquiring knowledge through the aid of the senses."

#### SENSORY AND MOTOR FACTORS IN PERCEPTION

The importance of sensory and motor factors in perception is clearly shown by the following instance. Mary was blindfolded on Hallowe'en and asked to touch various things on a table and tell what they were. With the exception of one or two objects she was able to name them.

Let us consider the facts involved in the perception of a stone. The stone was felt by moving and pressing the fingers against it. The feeling caused by the pressure of the fingers upon the stone is called a sensation. It felt hard and smooth; that is, the pressure was unyielding and even. When one realizes the meaning of such sensations perception takes place. Perception represents sensation, plus a certain amount of additional activity, especially that of recognition. There are several factors involved in the above illustration. The finger tips felt the stone through the aid of end organs in the skin, nerves and nerve cells in the brain. Without these three, there is no sensation or perception. The brain acts according to the sensations received. If the fingers come in contact with a hot radiator, the brain sends a message to the fingers ordering removal.

The different senses, touch, sight, hearing, smell, taste, motor, and organic, act to a large extent as protectors of the body. The eye and ear are the most important sense protectors of the body. The sight and sound of an approaching automobile warns a person who is about to cross the street to wait until the machine has passed. The ear, in such a case, often causes one to look for the automobile.

The eye enables one to tell more accurately how near the machine is and at what speed it is approaching. If the eye and ear inform us that the machine is not very near or approaching at high speed, we may judge the way safe for crossing at that time. The eye often serves to warn one against improper food. The eye prevents many accidents, as falling down stairs, burning one's self, etc. The value of the ear would not be so great did it not call the eye as an assistant. Touch is helpful in interpreting sight sensations, while taste and smell are less continually useful.

The senses aid one another to a great extent, thus increasing their general usefulness to the body and mind. None of the senses can be used effectively without movements and the sensations of movement that mingle with the special sensations. The loss of a single sense, even with other senses highly developed, leaves some trace of incomplete mental development.

### *Touch*

The nerve endings of the sense of touch are located most thickly in the tip of the tongue, the lips and the finger tips. These sensitive spots, you will notice, are the most movable parts of the body. The sensitiveness of these organs is due to these muscular movements and to experience as well as to the number of nerve endings.

The sensations brought about by pressure vary to quite an extent and the varying degrees of pressure bring about perception. The perception of hardness and softness depends upon intensity of pressure, while perceptions of roughness and smoothness are caused by variations and constancy of pressure. The pressure of a polished surface is even, therefore we perceive that the surface is smooth. The pressure of sandpaper upon the fingers is uneven, therefore perception says that sandpaper is rough. Yielding surface, as



cotton batting, is perceived as soft.

Touch, as we ordinarily think of it, depends upon pressure plus other movements. If we move our fingers over a velvet surface, we gain a much clearer idea of the texture or quality of the velvet than if we simply lay the fingers upon the surface. We need only to watch people at counters as they buy things to see to what a great extent the muscular movements of the fingers aid the sense of touch.

Excessive stimulation by pressure causes pain. If the hand be brought down hard upon the surface of a table, pain results. In the case of a needle, slight pressure is painless, while hard pressure is the opposite.

Heat and cold stimuli are received through the skin. Cold often carries with it the perception of dampness. Whether an object be perceived as wet or dry is largely determined by temperature. A cold, dry cloth is often felt to be cold and damp. If water be colder than the surrounding air it is distinguished as cold water easily. But if the temperature be like the temperature of the air, perception, through the skin, is somewhat baffled.

The following experiment was tried on a blindfolded student: the subject was touched on different parts of the hand and face with a pencil. On some places the lead felt cold, on others warm, thus causing the student to think that she was touched with different objects. The feeling of the varying temperatures is due to the fact that there are hot and cold spots on the body which give heat and cold sensations especially.

The sense of touch is of great value, not only to man, but to animals as well. All animals possess this sense and many of the lower animals have no other. The amoeba, for example, closes upon that which he feels is fit for assimilation, and shrinks from that which does not appeal to his sense of touch.

*Sight*

A student, on returning to her room after her first visit to another suite, was asked by her roommate, "How is the suite furnished?" The girl questioned was able to give a general description as to size, form, and color of the suite and its furnishings. All this was perceived through the eye.

Primarily size and form perceptions are received through the sense of touch, but this is largely done away with after early childhood, because sight tells us how familiar things will feel if touched. The child may for some time be deceived in regard to solids or rounded objects and needs to feel of them to understand their real shape and size.

Light and color perceptions are received through the eye alone. Color perceptions are produced by the vibrations of ether waves. The varying vibrations produce colors and their many shades and tints. A combination of all colors produces white and light.

The movability of the eye, which is greater than that of any other sense organ, gives one power to receive sensations and perceptions more rapidly. Thus in reading a book, one would naturally raise the eyes, at least in reading at the top of the page, and lower them at the bottom of the page. Without moving the eye there is quite a range in which one may perceive. For example, one student writes, "I am now facing a wall on which I can see several pictures. But besides the wall I can see out of a window which is on my right. By merely moving the eyeballs, I can see out of another window which is at right angles with the wall. If I move my head I can more easily see out of the window." The movability of the head and body greatly aids the eye. By movements of the head and body the progress of a bird or other swiftly moving object may be followed, as it could not be otherwise.

Objects may be so placed as to give the best range for the eye. A reader changes the position of his book or paper as he reads, so that he may perceive most easily and rapidly. Various changes of position affect the perceptions of the eye. For instance, a plate appears oval in some positions and round in others. It thus takes some time to learn to perceive the real shape of objects.

In very few animals does sight play as important a part as in man. The senses of touch, smell and hearing are usually more valuable to animals, though some human beings make much use of them.

The sense of sight is a wonderful gift to man, largely because it enables him to perceive so much more quickly than by the other senses. To perceive all the objects in a room by touch would take many times as long as by sight. However, if a person has never been blessed with it he does not feel the loss to such an extent as one who has had vision and has later been deprived of it. His loss is partly made up by the keenness of his other senses.

### *Hearing*

In a parlor were three girls. One was playing the piano, the other two were talking. Suddenly a strong breeze came in through the open window and knocked over a flower pot. A crash was heard. This illustrates the different kinds of sound which may strike the ear drum; the first, that of playing the piano, is called music, because music may be called rhythmical sound which is pleasing in pitch and key; the second, speaking, is unrhythmical sound, which may vary in pitch and tone. The noise produced by the crashing of the flower pot is still another illustration of sound.

Helen Keller can perceive music by touching her fingers to the instrument being played, showing that it is possible to

receive vibrations through the nerves of the fingers as well as through the ear drum.

Experiments have proved that one may perceive very accurately through the ear alone. After a deal of experience, a person accustomed to the sound of a train whistle can recognize the sound at a great distance and can estimate that distance by the degree of intensity of sound.

This power is aided to a great extent by movement. If we do not hear distinctly we invariably move into a position where we may hear better. Watch a person trying to locate a sound. Does he not move his head and body so that he may measure the sound in various ways and locate it?

The sense of hearing has a very important place in our education and pleasure, and especially in association with other people, for it is the first and chief sense used in communicating by means of language. We are thus able to converse readily, to listen to lectures, music, etc. We may say hearing is the most important sense in the social world, for even though one may be blind, if he can hear and speak, he may gain a great deal from people with whom he comes in contact. A deaf and dumb person does not know what other people are talking about, and cannot have the social pleasure of conversing with them.

### *Smell*

One student writes: "In passing through the corridor of the normal school, I often inhaled agreeable odors of food being cooked. It was not, however, until I approached nearer to the kitchen of the dormitory that I was able to distinguish what it was that was being prepared."

Smell is the sense by which we perceive odors. Odors are classified as being agreeable and disagreeable. It is impossible to state how many kinds of smell the nose can distin-

guish. Odors are results of vapors or gases present in the atmosphere. When we open an orange we inhale the gas which is given off, and can very easily identify it.

In some animals, and even people, the sense of smell is very acute, while in others it is not so keen. It may be highly developed, especially where there is a deficiency in other senses. To the animal smelling is believing. Smell, to many animals, is like sight to us.

Odors give information as to the character of food and drink, and as to the purity of the air. We recognize a pineapple by its delicious smell even before we taste it, while the same sense may warn us that a dangerous gas is escaping. The first scent of anything seems always the most acute. A girl working in a drug store said that at first the strong odors gave her a headache. Now she has become so accustomed to them that she does not mind their presence.

### *Taste*

A piece of sweet chocolate was placed on the tongue of a student who held her nostrils so that no air could be admitted. Do you think she knew what it was she was tasting? The only impression she got was that of a smooth, sweet substance in contact with her tongue. The quality she perceived by this special sense of taste was that of sweetness. But only when she was aided by the sense of smell could she perceive that it was chocolate and not peppermint in her mouth. So long as the chocolate remained solid, no matter how bitter a brand it might be, it would be impossible to perceive the taste. After any substance becomes a liquid its taste may easily be distinguished.

The kinds of taste are bitter, sweet, salt and sour. The different parts of the tongue respond to different tastes. The sides of the tongue are particularly sensitive to sour,

the tip of the tongue to sweet and to salt, and its base to bitter, while the center is generally almost insensitive to taste. Some substances, such as saccharine, produce one taste in one part of the mouth and a different taste in another part. All these facts are easy to explain by the theory that there are taste cells which always respond with a special sensation. Moving the object from one part of the mouth to another aids in perceiving the taste. It also reveals the consistency of food as well as the taste of it. By moving a piece of apple from one part of the mouth to another we may feel its crispness.

### *Organic Sensations*

To the sensations mentioned so far must be added those which come from the internal organs of the body. Hunger, thirst, and nausea are sensations received from the stomach. From the heart, lungs and other organs come numerous sensations which play an important part in making up the feeling tone of our lives. They do not, however, tell us anything about the world in which we live but only of our own physical conditions.

### MENTAL FACTORS IN PERCEPTION

There are other factors which aid perception, besides the sensory and motor factors just discussed. The following illustrations will show what these factors are:

### *Discrimination*

To tell the difference between sensations and know what they mean one must discriminate. It is by discriminating that we know which cake is the sweeter, which weight is the heavier, which sound is louder or of a higher pitch and which tint of a color is the lighter. A man named Weber was one

of the first to try to measure this power and he discovered some interesting truths about fineness of discrimination. The least difference that can be detected between two sensations does not correspond to the same absolute amount of difference in the stimuli producing the sensations, but to the proportional difference between them. For example, if you can just tell the difference between a pound weight and one an ounce heavier or lighter you cannot tell the difference between a sixteen-pound weight and one an ounce heavier or lighter but only when the difference is one sixteenth or one pound. If you can just discriminate the difference between a light of one hundred candle power and one of one hundred and one candle power, then a four hundred candle power light cannot be distinguished from a four hundred and one, but only from a four hundred and four candle power light. If a line an eighth of an inch more than an inch can just be seen to be longer than one an inch long, then a line eight inches long can just be distinguished from one an inch longer or shorter. This same truth seems to hold for all kinds of discrimination and is known as "Weber's law." According to this law, in measuring the fineness of discrimination we must consider the relative instead of the absolute difference in the stimuli.

### *Memory*

A little child of three, although told repeatedly not to touch the hot stove, did so, and burned his fingers. Whenever he went near the stove after that he always said, "No touch; burn baby's fingers." He remembered his past experience, and was able through this memory to make his perception more accurate than it could have been otherwise. Without memory our perceptions of any object would be limited to the sensation received at that moment.

*Knowledge*

A little girl who had been away visiting returned home and said, "Oh, mother, when I saw the electric car, I knew what it was right off. No one told me." How did this little child, who had never seen an electric car, recognize it? Her parents had given her a description of it and with this knowledge she was able to recognize it instantly.

*Habit*

One day, a class of normal school students was confronted for an instant with a card on which were many of the letters found in the word Fitchburg. They were printed in the following order: Fitchbusg. Glancing at it quickly, nearly all of the pupils called it Fitchburg. How was this to be accounted for? Without a doubt every pupil knew that those letters did not spell Fitchburg. The only way it can be accounted for is that the pupils had often given this name to a word which had the same general appearance. Through repetition, it had become a habit and this combination of letters was perceived as Fitchburg without noticing the parts in detail.

*Imagination*

As the girls left the observation class, Mary Brown and her friend became engaged in an interesting conversation. "Oh, Louise, the strangest thing occurred. I received a letter from Cousin Edith a week ago. She told me that she had purchased a new party dress while in New York. In a later letter I asked her to describe it to me, but she refused, saying that she would show it to me when I called at her house. Immediately I began to imagine its color and style. To my surprise when I beheld the dress, I found that my imagination had enabled me to picture it almost exactly."



When we are to try to recognize a sight, sound or odor we can do so much more readily if we imagine beforehand what it is like. We are more likely to find a lost article if we picture how it looks. Sometimes such images lead us to perceive what is expected instead of what is really shown.

### *Association*

About an hour after Mary reached home, she decided to have ginger bread and whipped cream for supper. She soon had the ginger bread in the oven. About fifteen minutes later, when she opened the oven door, she found, much to her dismay, that her ginger bread had failed to rise. Her mother asked her which dish she got the soda out of. Mary said, "The blue dish." She was then told that she had put in cream of tartar instead of soda. The cream of tartar and the soda looked alike and Mary could not tell the difference. Her mother knew the difference because she associated the blue dish with the cream of tartar and the white dish with the soda. If Mary had associated her ideas of the cream of tartar with some definite thing, she would have had a correct perception of it and would not have spoiled the ginger bread.

### *Assimilation, Classification and Identification*

These mental factors are in turn aided by certain processes which make our perception even more perfect. One of the normal instructors met a girl on the street one day and knew her to be a normal student. A few days later he met the same girl and recognized her as Miss Smith. The first time he classified her, and the second time he identified her.

"Oh, dear, some one has put all of our rubbers in one heap. How shall we ever find our own?" This was what

I heard when I went into the cloak room. Eventually, however, every one found his own rubbers. How was this done? I suppose they all found theirs as I found mine. I had certain fixed ideas of how my own rubbers looked. I knew that they had low heels, that they had a rolled edge, that they were new, and I knew the size. By the process of discrimination I finally recognized them. If I picked up a rubber which did not belong to me, I knew it was not mine because it had high heels or because of some other difference. Thus I identified each as mine or not mine in addition to classifying it as being a rubber. My perception in this case was aided by the processes of discrimination and assimilation.

### *Summary*

The above illustrations and examples show how imperfect our perceptions would be if they were not aided by mental factors, such as knowledge, imagination, memory, habit, association, classification and discrimination.

### ILLUSIONS

Some of our classmates were playing tennis. One stood waiting to receive the ball. She raised her racket and to the amazement of her companions ran forward and then stopped in the center of the court, looking surprised. The ball she was running for was still in the hand of the girl on the other side of the net. She had mistaken a sparrow for the ball. "That was an illusion," they told her. She had had a false perception, as was evident, and a false perception is an illusion.

If we look up "illusion" in our pocket dictionaries, we may find "hallucination" as a synonym, but they are not synonymous. Illusions are much more common for everyone can recall instances in his own experience.

*Hallucinations*

A business man who frequently had telephone calls at night sprang out of bed one night and shouted, "Hello" into the telephone which had not rung, and was surprised to hear central asking for a number. His room-mate told him that there had been no call. There was no foundation for this mistake, as in the case of the bird, hence it was an hallucination. Disordered minds frequently experience hallucinations. Normal minds do so in dreams and occasionally when awake.

*Causes of Illusions*

A man especially interested in birds took his camera into a meadow and awaited the appearance of some birds that had just flown into a clump of bushes. Soon a brown object flew up from the bushes and as he tried to focus his camera on it, he discovered that it was merely a dried leaf. Expectation caused this illusion. The man expected to see the birds fly from the bushes, and the brown object moving in a similar way deceived him.

One spring, many beautiful flowers were sent to a girl suffering from a nervous breakdown. Her windows were open, and the gentle breeze caused the flowers to sway to and fro. She noticed them and thought that they were faces of friends nodding to her. This was due to the disordered condition of her mind, proving that physical conditions cause illusions.

A member of our class tried on a pair of glasses which were thicker on one side of the lens than the other. She then tried to pick a small object quickly from the table, and later from the floor. She placed her hand about ten inches from the object, and then with another movement succeeded in obtaining it. The result was the same when she tried to

touch a chalk mark quickly with a piece of chalk; her mark would be at one side of the real mark. The longer she tried, the nearer she came to the real object. The reason for this was that light always travels in a straight line and the uneven thickness of the glasses reflected the rays so that the objects appeared at one side of their true position. In correcting this illusion she reached to one side of where the object appeared to be, and when she took off the glasses, recency of habit caused her still to make the correction, thus reaching the other side of the object. How many times have you looked into the edge of a mirror and seen yourself with three eyes or two noses? The reason is that you saw a reflection in the bevelled edge of the glass, and another in the mirror itself. A baby not used to a mirror will reach behind it, expecting to find another baby there. Unusual external conditions cause these illusions.

On the first of April a child received a piece of candy. Biting through the candy, she found it stuffed with cotton. Because the appearance was favorable she inferred that the candy would taste good. Often, as in this case, false inferences cause illusions.

Thus we see that illusions may be caused by expectation, habit, physical conditions, external conditions and false inferences.

### *Senses Concerned with Illusions*

A class mate tells me that her small brother once dropped a piece of ice down her back, making her think for a few seconds that she was burned. The stimulus was so strong that an illusion of touch resulted. A girl arriving home after a nature walk declared that a pin was pricking her arm; a burdock was picked from her sleeve and the pricking ceased.

A story is told of a fraternity boy who awoke one night,

and, to his horror, saw what he thought to be his roommate hanging from the chandelier. When he turned on the light he found only a dress suit. It was an optical illusion that made him mistake the suit for his friend. Illusions of this kind are very common.

One windy night one of our class mates sitting in her room called out, "Come in." No one had knocked at the door but the wind had rattled the window. A boy, whose name is Chester, thought his father called him, and answered, only to find that his father was telephoning and had said, "Yes, sir." These are illusions of hearing.

A girl was blindfolded and had some hot water and pepper put on her tongue. She was asked what it was and promptly answered, "Wintergreen." The slight resemblance between the two caused the illusion of taste.

Did you ever hear any one say, "I smell smoke," and then go in search of the fire, when really the odor came from something near at hand? This is an olfactory illusion, or one of smell. Every sense may be the source of illusions.

#### SPACE PERCEPTION

Space perception is the ability to localize objects and sounds, to judge size and form, and to estimate distances through the aid of the senses and various mental powers. All the senses, with the exception of taste, have been found to play some part in space perception, namely: sight, hearing, touch and smell.

#### *Sight*

The normal students, knowing the directions from the building, are now able to point out and give the directions of several places. When these places and their own surroundings were new to the students, they were not able to do this. They have used their power of sight in the per-

ception of these new objects and their direction.

A bird is seen and heard many feet away. With the aid of facts already stored up in our minds, we are able to perceive the approximate distance between ourselves and the bird. On the other hand, if our perception has been made through the sense of hearing alone, we would only have known that it was quite a distance away.

One of the members of the class who lives near an observatory says that she can tell whether the people in the observatory are children or adults by their size. She knows what a child looks like at that distance, and so uses her knowledge in her discrimination. The size of objects aids in estimating distances and the knowledge of distance aids in determining size.

Therefore sight is the most important sense in space perception and the most accurate. If we perceive space through touch or any of the other senses and are in doubt about our conclusions, we generally refer the specific case to sight and accept its testimony as our final authority.

### *Hearing*

A person was blindfolded and told to point, as nearly as possible, to the exact location of a sound. The materials used in making the sounds were an empty ink well and a pencil. It was found that sounds could be located correctly, in most cases, when made on either side of the ear, but when the sound was directly in front or behind, the subject could not judge accurately the position. This may explain why people turn their heads to either side, in order to hear better.

If we are crossing the street and hear the honk of an automobile we can tell from which direction it is coming, and by using our sense of sight we confirm what we have heard, and act accordingly. Therefore, hearing and sight

together give us more accurate perceptions of space and save time.

### *Touch*

An experiment was tried by touching the skin with a wire hairpin. First the points were placed together and then gradually separated. The person was unable to tell that two places were being touched until the points were quite a distance apart.

Several persons were touched with a pencil point on their hands, arms, faces and necks. The places touched could be located on the hands most accurately and on the right hand better than the left. The places touched on the neck were not located accurately. This experiment proves that all parts of the skin do not produce the same sensations, or, in other words, do not have the same qualities.

These, as compared with previous experiments, prove that we do not perceive so accurately by touch alone as when aided by sight.

### *Smell*

If a hunter wishes to go very near to a deer he must go against the wind. If he should go with the wind, the deer would know that he was coming and get out of his way long before he could see the hunter. Thus the deer, as do many other animals, uses his sense of smell in perceiving the direction of dangerous objects.

The hunter who is out in the forest uses his sense of sight and hearing to find out whether there is a deer near him. He does not use his sense of smell in order to find the deer. Thus the sense of smell in perceiving space relations is used more by animals than by people.

If a person should smell smoke and could not tell by using his sense of sight where it was coming from, he would use

his sense of smell by turning his head from side to side to discover the direction. Smell does not, however, play as great a part in space perception as the sense of sight, hearing, and touch.

#### CONDITIONS FAVORING PERCEPTION

There are times when a person perceives better than at others under the same circumstances. When the physical condition of an individual is poor, his senses will not be as keen as they otherwise would be, for all the senses are affected by the general health. These facts are proved by the examples given under the following topics:

##### *Health and Perfectness of Sense Organs*

A teacher used the blackboard for a great deal of her work. A little boy who never had his lesson told the teacher that he could not see the board. Finally it was discovered that he had nearly lost his eyesight, and had not been able for some time to see the work. A certain little girl was very backward in her lessons, and did not appear to be interested in any way. Finally her parents took her to a physician and had her examined. The doctor found that she had adenoids. After their removal she was a different child, and became one, if not the best, of the scholars in her class.

One student says: "After opening a bottle of medicine I smelled of it, as I usually do, to find out its ingredients, but I was unable to smell anything because of a bad cold."

##### *Intensity of Stimulus*

When the skin becomes extremely cold a warm object placed on it will give a burning sensation. A continued low temperature numbs the skin, and pressure upon it at that time cannot be felt. A cold object feels larger than a hot object, even though the two be equal in size. Thus the



sense of touch is affected by the temperature.

The greater the intensity of the stimulus the greater the sensation. When a person enters a greenhouse there are usually several fragrant odors, but there is one which prevails over all others, that of the carnation. A strong, fragrant or pungent odor is more quickly perceived than a faint odor, and more readily recognized.

One day as I stood on the street waiting for a car, a girl asked me if I saw those two normal students pass by dressed in blue suits. I replied, "No." Then she said, "Did you see that girl go by with that exceedingly bright dress on?" "Yes," was my reply. I began to question myself as to the reason that I did not notice the girls dressed in blue. I found that the sense of sight was greatly affected by the intensity of the stimulus. An exceedingly bright object will attract the attention much sooner than a dull object.

### *Repetition and Frequency*

Repetition affects the sense of taste. When food is first taken into the mouth, the sense of taste is very keen, but constant repetition dulls it. Frequency of the stimulus tires the nerve endings to such an extent that the sensations are less easily felt.

Frequency also affects the sense of sight, sometimes making the person more accurate in the use of that organ. In looking at a picture for the first time we see only the general outline, but on seeing it again we notice the details, and so on until the very minute points of the picture are recognized. On the other hand, very familiar surroundings are observed in less detail than new ones.

### *Attention*

Sensations that would ordinarily not be noticed may be-

come very clear through giving attention to them. In fact, of the many stimulations of the sense organs, we are aware of but few because we do not attend to them. This is impressed on one when he tries to hear every sound or notices the skin sensations in different parts of the body.

### *Atmospheric Conditions*

On a day when the air is very heavy children are very restless and difficult to control, while on a pleasant day they are usually more quiet. Therefore atmospheric conditions affect pupils and teachers.

### DEVELOPMENT OF PERCEPTION

Perception plays such an important part in the life of every individual that it should be developed to its fullest extent.

The difference between a child and a man as to their ability to perceive lies in the fact that a child is just beginning to develop his powers of perception, while the man, by association and experience, has developed his powers to a greater extent, so that he is able to adapt himself to his surroundings.

A child was given a block to play with. He looked at it, pounded it, tasted it, and brought every sense into action until he knew it. If the block had been placed in a different position he would have still recognized it as the same block, although its appearance changed with position.

Harry, one and one-half years of age, was given a small cart at Christmas time. He had never seen a cart before, but now he had one of his own. The boy's father was very much interested in psychology and noticed the development of the child's perception. By observation the child had formed a general image of the cart, by touch he perceived

that it was hard and by drawing it across the floor he noticed that it made a noise. Thus through the senses the various characteristics of the cart were perceived. Soon after the child saw one of his little friends pulling a toy. He called it a cart because it looked like his and was used in the same way. Later the boy learned that there are many types of vehicles classed as carts. By discrimination he was able to distinguish the individual from the class.

Richard, a very small child, was given a kitten to play with. He became very fond of the pet. One day when playing out of doors, he saw a caterpillar crawling along the walk. He ran into the house and said to his mother: "See the pretty kitten I found out there on the walk." He had placed both objects in the same class because he noticed the fur on each and thought they looked alike. After his mother explained the differences between the two objects he was able to distinguish the class of caterpillars from the class of kittens, although he might not know the particular species of kitten or caterpillar.

A boy had just entered school. He knew many words but had not learned to read. He learned words by rote and later was able to recognize them by sight. Soon he was able to think out words for himself because he found some familiar characteristic in the new ones. For example, the boy knew the word "rat" and was able to make out the word "mat." By assimilation he recognized the sound "at" in both words. By discrimination he noticed that the first letters were not alike and as he knew the sound of "m" he was able to make out the new word.

A man entered a store, tasted some coffee, and immediately stated the grade to which it belonged. Many years before, his perception of coffee would have been that of an ordinary person, merely its pleasing taste. By observation and prac-

tice he was able to associate various tastes with particular grades of coffee. Special training along that line had made his perceptions keen and accurate.

The children in a certain class were drawing and coloring pictures of toys which were to be placed on a calendar to be taken home. The children noticed the size, shape and color of the toys and were very careful with their work, because they were doing it for a special purpose. Sense discrimination may be improved if it is employed in gaining some specific end or purpose. Summarizing, the important aids to the development of perception are these: assimilation, discrimination, association, special training and study, and specific purpose.

#### APPERCEPTION

We have found that only very young children have pure sensations. These sensations develop perceptions and ideas in the mind. When the number becomes great enough the child begins to classify them, and thereafter each new sensation and idea is classified and connected with something previously known.

For example, a child has seen a great many square tables. When he sees a round table he groups the new perception with the old and knows that this new object is also a table. This grouping of old ideas with new is called apperception.

The relation of the words perception and apperception in form suggests their meaning. Apperception is perception carried further. Perception and apperception are so closely related that it is difficult to tell where one stops and the other begins. The main difference is that in perception the senses are always used. In apperception the mind is active and by means of attention groups the new perceptions with the old ideas so as to form new ones.

If one hand is placed in hot water and the other in cold

and then both are placed in luke warm water, the water feels cold to one and warm to the other, respectively. This is due to the different previous experience of the two hands. The mind acts in a similar way. The same sensation or stimulus will produce different results in minds that have had different experiences and masses of ideas.

This is well illustrated by an experiment made in a class of normal students. Four students were asked to answer this question: "What was the result of the contest?" The first girl answered, "The Clinton girls won." The second reply was, "The Athletics won the final game." The third replied, "The Overland finished with the best score," while the fourth girl stated, "Miss B. won the first prize." The first girl was captain of the girls' basket ball team. The second was a base ball "fan," and referred to the recent "World's Series." The third one questioned was an ardent automobilist and referred to an endurance test. The fourth girl was interested in elocution and referred to the result of a recent prize-speaking contest. The word "contest" called up different ideas because of different previous experiences.

Two men standing on the street corner observed a friend boarding a car with a suit case in his hand. "Evidently Jones is going on a vacation," remarked the first. "No, I think he is going to the wash woman's with his clothes. This is Monday, you know," replied the second, evidently judging from his own custom.

What one perceives and apperceives depends, therefore, on his nature and stock of ideas, or, in other words, his character, habits, memory, education, previous experience and mood.

Apperception, or association of ideas, is of great importance in teaching. It is back of the familiar recommenda-

tion, "proceed from the known to the unknown." A good teacher always considers previous experience and the present state of the pupil's mind when preparing a new lesson. Sometimes a teacher first asks a great many simple questions which every member of the class is able to answer. This seems a waste of time, but is really necessary to secure the proper state of mind for the new material. Good teaching consists in fitting the stimuli to the child's knowledge for the purpose of adding to it. We must not only start with the known, but also proceed to the unknown as well. To simply elaborate the review is a violation of the laws of apperception that is no less an error than to give facts that cannot be understood.

## VII

### FEELING

#### NATURE AND USES OF FEELING

WHAT sort of a world would we inhabit if we had no power or sense of feeling? We might gaze at a glorious sunset without being moved; we could see our very dearest friends leaving us forever without the least touch of sentiment. We should be merely creatures of clay, without being at all affected by the wonderful panorama of life about us.

Mental phenomena may be classed under three divisions: feeling, intellect, and will. *Feeling* is aroused in a jockey who is about to enter a horse race. He is thinking of winning the race and the honor to be gained. *Intellect* plays the most important part in the work of the scientist. The use of the *will* may be shown in the case of the school boy who desires to go fishing but who keeps his mind on his work and completes his problem.

The elements of feeling, intellect and will enter into our lives most of the time. Sometimes one predominates, sometimes another. Our intellect may say to us: "You have a few minutes of leisure, and you should answer those letters," but we may dislike to write letters so heartily, that our feeling rules our intellect. Then our will power may "step in" and suppress our feelings, so that in the end the letters are written.

Feeling, the motive of all action, is a term that is used in

many different senses. It is made to cover a wide variety of mental activity, from the sensations received by the skin to the vague intellectual appreciation of truth. We "feel" with our fingers and we "feel" that certain things are true, although we may be unable to prove them by any formal methods.

According to Professor Dewey, "Feeling is coextensive with mental life; it is its internal aspect." There is feeling in every phase of consciousness.

There are many kinds of feeling, but we divide them into two main classes, pleasant and unpleasant. The loss of a friend, a toothache, and a torn dress, all cause very different feelings; yet they are all classified as unpleasant. In the same way, a beautiful day, a finished task, or a smiling face give pleasurable feelings; yet each is of a different sort.

Frequently this element of feeling proves stronger than knowledge and will combined. Very often we do things because of the pleasurable feelings that may ensue, even when we have firmly decided not to do them.

Although it may seem that feeling *is* life and therefore the aim of life, it was not thought so by the majority of our class. This is well expressed in Longfellow's *Psalm of Life*. He says:

" Not enjoyment, and not sorrow,  
Is our destined end or way;  
But to act, that each to-morrow  
Finds us farther than to-day."

#### VARIETIES AND CLASSES OF FEELING

Feelings vary widely. In order to find out something as to the varieties of feeling, each member of the class was asked to make a list of all the feelings of which he could



think. One student passed in a list of one hundred four, which shows how great the number is. They vary from those of a very mild form to those of great intensity. Feelings also differ with persons. The same object or stimulus may produce entirely opposite feelings in different people. When we realize the great number of feelings we recognize the fact that, in order to talk about them intelligently, there is need of classification or arrangement.

A good classification is as follows: instinctive, organic, sensory, and ideational feelings.

*Instinctive* feelings are those determined by natural impulses or propensity.

*Organic* or physiological feelings play an important part in our lives. Examples of this class of feeling are hunger, thirst, nausea, and weakness. These have a certain effect on other feelings and emotions. For instance, when not feeling well, one does not appreciate a humorous anecdote as much as he does when enjoying good health.

*Sensory* feelings are those produced through the five senses, taste, touch, sight, hearing, and smell, and those resulting from movement or the kinæsthetic feelings.

Certain ideas arouse *ideational* feelings or sentiments; *e. g.*, home, country, duty.

Another more common classification of feelings, previously mentioned, divides them according to the pleasure or pain which they give. Under the pleasurable feelings are love, courage, sympathy, kindness, satisfaction, joy and pride. Among the painful feelings are hunger, thirst, fear, anger, hatred, sorrow, embarrassment, and disappointment.

Feelings may be also classified as primitive or instinctive, and developed. Under primitive feelings are the following, — fear, anger, jealousy, love, selfishness, and curiosity. Under developed feelings may be listed hatred, sympathy,

pride, patriotism, faith, courage, and responsibility.

Feelings may also be grouped according to their intensity.

From these various classifications it is apparent that the same feeling may be placed under many heads according to the way in which it is considered.

#### SOURCES OF FEELING

Feeling may arise from four sources, (1) senses, (2) instincts, (3) organic processes, (4) mental activities.

A *sensory* feeling is any feeling that is the direct result of sight, hearing, touch, smell, taste or motion. Nature's beautiful phenomena, a moonlight scene, or continuous rolling of the ocean's wave upon the beach will give sensory feelings that are agreeable. Contrast these with the feeling one experiences from looking directly at the sun on a summer day, or the filing of a saw. Compare the feeling we receive from the touch of downy milkweed floss with the one produced by a burdock burr, or the smell of burning rubber with the perfume of violets. An incident was told in class of a small child who was very fond of confectioner's sugar. One day she found a bag which, she thought, contained the desired sweet, so she helped herself generously. Imagine her surprise in finding that instead of sugar she was eating soap powder. Thus we see that we may experience very agreeable and very disagreeable feelings through the senses.

*Instinctive* feelings are those which come through performing certain acts without having had any previous experience or knowledge and they are usually involuntary. A girl told of her first ride in a Ferris wheel. When she reached the greatest height the wheel stopped and her seat began to rock perilously; she said she experienced two feelings, one of fear, the other an impulse to cry out for help. Both these feelings were instinctive.

An *organic* feeling is one arising from the organs. A person in poor health or in great deprivation often experiences feelings which a person in a normal condition cannot realize. Arctic explorers have been known to become so hungry that they were willing to eat shoe leather. Children at the age of their most rapid growth show feelings of supersensitiveness, timidity and fear which do not appear before or after this adolescent period, and which are due to the organic changes going on at this time.

From these comparatively simple feelings we proceed to those dependent upon the complex *mental processes*. Memory, imagination, knowledge, and association of ideas all play their part in determining the character of feelings. Memory of the taste of food may cause pleasure or distaste, according to experience. Previous to final examinations in a school or college the students live in dread. This feeling is caused by imagination, knowledge of possible consequences and association of ideas. A young lady in a certain school felt very sensitive about going among a particular group of girls. She felt that there were some of them who had a feeling of enmity toward her. Later she found that they all regarded her in the most friendly way. Thus her feeling was caused wholly by imagination. One who had passed through a great sorrow said afterwards that at first she experienced a sense of numbness and as this wore off she felt sore in body and mind.

From the preceding illustrations and facts we may conclude that feeling originates from our senses, instincts, physical condition, and mental processes.

#### THE SENSES AS SOURCES OF FEELING

The senses are very important sources of feeling. If it were not for our senses, we should have no feeling concern-

ing the things around us.

Some senses produce much more feeling than others. One person may obtain very intense feeling from a sense which would give another person very slight feeling.

The senses vary as to prominence in producing feeling, compared with their usefulness in giving knowledge, in the amount and in the intensity of feeling given. The final results of a test taken in class are as follows:—

In order of prominence in feeling as compared with knowledge gaining, the senses rank as follows: taste, smell, motion, touch, hearing, sight; in order of intensity of feeling experienced, touch, taste, smell, hearing, sight, motion; and in the order of total amount of feeling produced, sight, hearing, touch, taste, smell, motion. Here sight and hearing rank higher, because those senses are used so much more frequently than the others. We are seeing and hearing things nearly all the time, while, generally speaking, we eat and taste only three times a day.

The subject of sensory feeling is so broad and plays such an important part in our lives that it cannot be taken up as a whole, but must be treated under separate topics.

### *Sight*

The sense of sight, without aid from the other senses, gives us two elementary sensations, light and color. The effect of sun shining on glass or tin is disagreeable, whereas the light shining through the leaves of a tree produces a very pleasant feeling.

Sight is very important as regards both knowledge and feeling. In looking at a painting of a battle, a feeling of horror of war and of admiration for the noble men who fought for their country may come into our hearts. This is caused by the ideas that enter our minds, while the feeling

produced by the sense of sight alone is that derived from the color and lines of the masterpiece. One experiences a pleasurable feeling when looking at a rainbow or a sunset, even when ideas associated with pleasure are not aroused.

### *Hearing*

Sound, as a producer of feeling, is not as prominent as some of the other stimuli, but as a knowledge giving organ the ear ranks second. Both pleasure and pain may be derived from the sense of hearing. A piece of music, beautifully rendered, may move one to tears or give a pleasurable feeling of peace and restfulness; while, on the other hand, the sound of a loud, shrill whistle may cause a person to have a feeling of irritation. Of course in the case of music the feeling aroused is not wholly sensory but a large proportion of the sounds that we hear are in themselves at least slightly agreeable or disagreeable.

### *Touch*

Touch, as a producer of feeling, may be effective through either of the four cutaneous sensations, pressure, warmth, cold and pain. It produces more feeling than knowledge. As connected with knowledge, it is often used for determining the texture of materials. Through the sense of touch, we have the most primitive feelings of pleasure or pain. If the skin is touched with something sharp, the feeling is painful; while touching surfaces having the qualities of smoothness and softness, as velvet, gives pleasure.

Temperature, in connection with touch, is an important producer of feeling, especially when there is contrast, as when a person puts his hand in ice water and then in warm water. In such a case the latter may seem almost painfully hot when the temperature is really only moderate.

*Taste*

Taste is probably used more than any other sense to get feeling. To a large extent people eat only those things that give the pleasantest taste sensations. Taste gives very little knowledge. Cooks, druggists and chemists are the principal ones who use this sense for the purpose of gaining information. A student once attended a "Sense Party."—Many different kinds of spices and flavored articles were passed around to the guests, and each one was asked to taste them without looking at them. The result was that very few named the articles correctly.

Many experiments prove that by covering the nose, so that the olfactory sense cannot be used, many substances which are usually said to have a very decided taste, seem practically tasteless.

*Smell*

The sense of smell may give rise either to pleasure or discomfort. Although an odor may be unpleasant to one person it cannot be always classed as disagreeable, because the element of experience here, as in other cases, may greatly modify the feeling for each person. An odor very unpleasant to one may be liked by another.

As regards intensity, we may enjoy the odor of certain things at a distance, but when brought very near we may positively dislike it. For instance, a person in passing a doctor's office used to enjoy the smell of ether, but when the same person was obliged to take ether the feeling was very disagreeable.

Smell and taste are very closely connected, since a cold in the head will make both less acute, though in reality it is smell that is chiefly affected and we lose in power to perceive odors rather than in taste proper. The pleasure which we obtain

from the sense of smell makes life more vivid and interesting. A lovely rose is beautiful to look upon, but it appears even more beautiful if we get its fragrance.

### *Motion*

Motion gives a feeling of pleasure or the opposite according to its character, free rhythmic motion generally being agreeable. Motion also is a means by which our feelings are manifested outwardly and are often thus increased.

It permits our other senses to become greater sources of feeling, not only because we are able to move from one place to another and receive impressions which could not be enjoyed in any one place, but because each sense is made more effective by motion.

#### PHYSIOLOGICAL PROCESSES OR ORGANIC SENSATIONS

The organs of the body and the physiological processes are sources of very strong feeling. From them we experience such feelings as hunger, thirst, nausea, fatigue, etc.

The following is an example given by one of the class, showing the intensity of an organic sensation, namely, thirst. "I had been picking berries nearly four hours. After the first hour had passed, I began to feel thirsty. My throat was parched and my head ached. On reaching home, I drank several glasses of water. For a few minutes I felt better, but soon my head ached again. I seemed more tired than before and discovered that my thirst had not been quenched. After taking a little water at a time and resting, I soon felt better."

Hunger is sometimes as intense as thirst. It is much more difficult to work when one is hungry than when one is thirsty. This example was given: "One afternoon, shortly after school closed, I was so hungry that it seemed as if I could not endure it. It affected my disposition also,

for I was so cross that every one noticed it. Upon obtaining food, I felt better and my attitude was immediately changed."

The "tired feeling" is one of the most disagreeable. We may feel stupid, completely exhausted, and oftentimes a terrible drowsiness comes over us. It seems as though we must rest before attempting to accomplish anything worth while. One girl writes, "Some nights when I retire I feel very tired and sick, but after taking a good rest I am all right and feel ready to work once more." Another girl says, "I felt dull and dreary, although I experienced no pain. Everything I attempted seemed to go wrong. I found this was due to being over-tired. On the other hand, when rested I have felt so lively that everything seemed to please me. I could overlook all errors and find life full of pleasure."

It is usually conceded that physiological processes affect one's general attitude toward life. When one's system is in good condition, happiness and optimism usually prevail. On the other hand, if one is ill, unhappiness and pessimism may result. For example, "Once, when ill with a nervous breakdown, I did not want to see any one, even my dearest friend. All I wished to do was to sleep. Food did not appeal to me. But, when convalescent, I could not have friends enough about me."

Mood is dependent not only on our sensations and thoughts for its quality, but on physiological processes. When our mood is sombre and dark, all the world looks gloomy, and then again, if our mood is bright and gay, the world seems vibrant with joy.

Thus our feelings modify our temperaments and it is for us to so live that those feelings shall be developed which tend to give us a happy disposition and a bright outlook on life.



## INSTINCTIVE FEELING

Instinct is native tendency, which causes us to act in certain ways involuntarily, without a definite end in view.

We find instinct to be a very important source of feeling. Why is it that we feel angry when insulted, sad when we see a friend suffering, or afraid when danger threatens us? We do not take time to reason and decide in each case what our feeling shall be. It is instinct which causes these emotions.

Some of the most important instincts common to us all are,— fear, anger, pity, self-protection, curiosity, love, hate, etc.

The feeling most frequently aroused is *fear*, which causes us to avoid danger. Many of us have feelings of fear although our intellects tell us that under the circumstances there is no real reason for being afraid. One member of the class states that the sight of a mouse always arouses fear, yet she knows that it cannot harm her. The fact that children are afraid in the dark is largely due to instinct, although ideas have much to do with that particular feeling. A child sent out after dark may see in some familiar tree or stone wall, ghosts, goblins, witches, bears, lions or other such apparitions. For this reason, we should not tell children stories of wild animals and goblins unless we make them understand the exact facts. In many cases these foolish fears last throughout a life time, while in other cases they are overcome. Some of the physiological accompaniments of the instinct of fear are trembling, turning pale, screaming, becoming faint, and so forth.

*Self-protection* is one of the first laws of nature. For example, a very small boy liked to play with a cat. This cat often hid under the lounge and when the little boy tried to drive her out she scratched his face. He solved the difficulty, however, by going under the lounge feet first. It

was instinct that made him feel that he must protect himself and with his reasoning powers he decided how to do it.

*Curiosity* is one of the most common instincts. To a certain extent it is valuable, because in many cases it results in our gaining knowledge. For instance, the class was shown a figure called "deral," which was new to all the members. Their curiosity concerning it was aroused, and, as a result, they consulted the dictionary for a definition of the figure and also asked other instructors their ideas concerning it. Curiosity may be useful if properly directed, but it may be harmful as well. One girl writes, "One day my brother brought a little box into the house and told me not to open it. After he had gone away, my curiosity got the better of me and I opened the box. A bee flew out and stung me."

*Anger* is another instinctive feeling. Some people are able to control their anger and after a lapse of time it passes away; but many people fly into a violent passion, often saying and doing things they are very sorry for afterward. The feeling of anger disappears more quickly than in the preceding case. Some of the physiological accompaniments of anger are frowning, clenching of fists, turning red or pale, screaming or keeping very still.

Since instinct plays so important a part in our feelings and actions, we should try to suppress those instincts which are injurious and cultivate those which benefit us.

#### IDEAS AS A SOURCE OF FEELING

Feelings which depend for their origin upon a mental state are called ideational feelings because they are based upon ideas. In many cases the longer we dwell upon an idea, the deeper is the feeling aroused. If something occurs that angers a person, the more he thinks about it, the more intense

the feeling is likely to become.

The intensity of feeling caused through memory depends upon the recency and the association of ideas. For example, the word "fire" brings to the mind the idea of confusion. That in turn suggests a running crowd, firemen, and so on through a long series.

There is a law that says, "Recalled feelings are pleasant or unpleasant, corresponding to the feeling given by the actual experience." For instance, we may have had a very pleasant vacation during the summer and then we may enjoy it again later in memory. On the other hand, the recall of the feelings we experienced while the dentist was drilling our teeth may be very unpleasant.

Imaginative ideas likewise produce a great amount of feeling and its intensity depends upon the clearness of the images. For instance one may imagine what he would do if he had plenty of money and thus enjoy the pleasures of wealth while still poor. We often imagine conditions which would contribute to our happiness and this is often called "day-dreaming."

There is an old saying, "Anticipation is better than realization." Thus it seems that our imaginary enjoyment of an event to come may be strong enough to produce more pleasurable feelings than the event itself. A certain small girl was to go to a circus. She spent the day before in talking about it, how the animals would look, what she would have to eat, what the clown would say and what dress she should wear. Her eyes sparkled, showing the very excited and pleasurable feelings she experienced. The last thing she said at night was, "Now I'm going to think some more about the circus."

At the circus the next day she experienced pleasurable feelings but not with the same intensity, as was shown by

her remark, "It's more fun to *think* of circuses."

Sometimes our ideas give us feelings that are far from pleasurable. The following experience is told: "I was to sing at an entertainment and my song was the last number on the program. All through the evening I sat and imagined how I should feel when I stood upon the platform. As a result a feeling of dread, of terror and of nervousness came over me. I also thought of how I should feel if I won the prize, and I would half smile and have a happy and proud feeling. Then the thought would come to me, 'What if I should fail utterly?' Following such thoughts my spirits fell and I was miserable."

We also use our imagination in reading or in descriptions. For example, if one is reading a book which contains no pictures, one will imagine how the characters and scenes look. Different people will image the same scenes and characters in entirely different ways. The reader who has the most vivid imagination will have the strongest feelings aroused.

Feeling also arises in our thought processes. Nearly every one has experienced pleasure when a difficult problem has been solved, but on the other hand failure causes a feeling of unpleasantness.

As regards abstract ideas, duty, for instance, gives us a feeling of responsibility and obligation; religion, a feeling of awe, reverence and respect; patriotism, a feeling of love, pride of country and ambition.

#### CONTROL OF FEELING

The control of feeling is important because it not only influences the life of the individual, but of those around him as well. The four different kinds of feeling, instinctive, sensory, organic and ideational, can be controlled by means of a continued, persistent use of the will power. Their in-

tensity varies according to the amount of control which is exercised. There are four ways of temporarily controlling feeling: (1) by controlling the muscles, (2) by changing conditions or environment, (3) by transferring the attention and (4) by changing action.

A permanent modification of disposition may be accomplished by the continued use of these four ways of controlling feeling. A nurse, who, in spite of a natural feeling of pain and revulsion at the sight of suffering, smiles placidly and calmly pursues her duties when she feels more like running away, serves as a good example illustrating the control of feeling.

Another instance is described as follows —“ I was reading one afternoon when a girl came in and began to tease me until I finally became exasperated. My first impulse was to speak sharply to her, but I exerted all my will-power and succeeded in remaining silent. Nevertheless, my muscles were tense, and I felt just as provoked and even more so because I had not let her know my mind. At the same time, I felt a little better pleased to think that I had managed to control my feeling. Soon she stopped teasing me, but the only way I could avoid being angry was to think of something else. Then my muscles relaxed, and I began to feel more pleasant.”

The control of organic feeling through the control of the muscles is well illustrated by the common case of a sick person, who, in spite of physical ailments, bravely tries to appear cheerful and really feels better in consequence.

The second method of temporarily controlling feeling is by change of conditions or environment. The illustration of this is given by one student, who writes: “ There is a young doctor living in my home town. Sometimes practice is dull and he is depressed and easily annoyed. Then he

leaves his office and seeks his father's law office. After remaining there an hour or so he is much more cheerful upon his return."

A similar illustration regarding sensory feeling might be given concerning a person living in a noisy apartment house who changed his dwelling to rid himself of the noise and resulting irritation.

An illustration showing how organic feeling may be controlled by change of environment tells of the relief given a sick person by being removed from a very much tossed bed to a freshly made and clean one.

A girl in school gives the following example of control of feeling by the method of changing the attention. "My sister and I used to compete with each other to see who could take some bitter medicine with the better grace. We were so much occupied in not showing our real feelings that we oftentimes barely tasted the medicine."

The following example illustrates how feeling may be changed by the method of controlling the muscles. A student says, "One evening just before my turn came to speak before a large audience, my heart began to beat very fast, my breath to come rapidly and my muscles to grow tense. I turned my attention from the audience and tried to breathe more regularly. Soon my muscles relaxed, and my heart stopped thumping, so that I was no longer frightened."

A girl gives the following example of control of sensory feeling by the method of concentrating attention on something else. "I was studying when a record was started on the victrola. At first it annoyed me but I put my thoughts on my studying and writing to the exclusion of everything else, and it soon ceased to trouble me."

Under control of organic feeling by a change of thought or attention one girl gives the following example. "I was

ill with scarlet fever when one day news came that a friend of mine had died of typhoid fever. My sufferings went unnoticed that day in thought of my friend and my great thankfulness of heart for not being any worse than I was."

The fourth and last method of temporary control of feeling is acting in a way opposite to that suggested by the feeling. The example concerning instinctive feeling tells of a young lady who reports that when any one finds fault with her unjustly, or tries to get off a joke at her expense, she turns the tables and jokes about them good naturedly, instead of showing anger as she might easily have done. This not only changes the inclination of friends but makes her feel pleasanter as well.

The best way to control feelings by action is to engage in acts the opposite of those one feels like performing, *e. g.*, act brave when frightened, behave as if attracted by what really repels, etc.

The permanent control of feeling, by a combination of the four methods of temporary control, is best illustrated by the following anecdote.

A certain girl here in school was fond of another girl who had returned her liking but suddenly ceased to have anything more to do with her. The former, after definitely ascertaining that all her friend's feeling for her was gone, determined to rid herself of her own affection. She moved to another part of the dormitory where she was not likely to see her former friend often, occupied herself with other interests and friendships, and, whenever she came in contact with the girl, showed by neither expression nor action that conditions had been changed. For months this continued, and finally she herself ceased to care. This proves that in some cases, if our feelings find no expression, they grow less and less until they finally cease altogether.

## LAWS GOVERNING FEELING

Just as everything in nature is governed by laws, so is feeling. The general truths regarding feeling are as follows.—

(I) *Feeling and physiological conditions are correlated.*

The following illustrates: “At one time I crossed a river on a cable where a large power-dam was under construction. I was not afraid at first, but when almost half way across I looked down the hundred feet to the bed of the river and became frightened indeed. I had such a feeling of fear that I was hardly able to move and when I reached the other side I was so weak I could scarcely stand.”

(a) There are two kinds of changes which accompany feeling, external and internal. These are illustrated by the following examples.

When one hears bad news, the face loses its animated expression and becomes sad and gloomy.

A woman hears of a robbery which happened at a near-by house. She becomes very much excited and her heart beats very much faster than under normal conditions.

(b) External and internal changes *usually* occur together.

When one becomes very angry, the eyes snap and the heart beats faster.

(c) When suppression of external signs of feeling occurs, without change of attention, the activity in the vital organs is often increased and hence the feeling is intensified.

If anything amusing occurs at a place in which one would not wish to laugh, the desire is suppressed outwardly, but internally the feeling is more intense.

(d) If our feelings are given free expression, they may decrease because the internal organs are relieved of tension. This is why the people who show their grief at the loss of a



dear friend by outward expression are often the ones who forget their sorrow soonest.

II. *Change in external conditions produces more intense feeling.*

This is the great law of feeling. We students at Normal never appreciate our homes until after going to school. When vacation comes and we hurry home it seems much dearer to us than before.

If we look at a green curtain for several minutes and then turn our eyes to the blue wall paper, the paper looks much more brilliant than formerly.

(a) Contrast implies an extreme change in degree as when heat follows cold or the reverse; sweet, sour; or sorrow, joy, and in each case feeling is greater than when the stimuli are separately given.

There is a natural physiological tendency for an extreme activity of any kind to be followed by its opposite.

With no change in external conditions crying and laughter, exaltation and depression often succeed each other.

It is because of these two laws that a skillful speaker, by changing from pathos to humor, and from the amusing to the pathetic, may at will move his audience to laughter and to tears.

(b) The effect is much greater when the change from one degree to another is rapid. Daylight coming gradually or a room growing cold slowly produces little feeling, while a flash of a light or a draft of cold air may be distinctly disagreeable.

III. *Accurate thought and extreme feeling are rarely found together* but a moderate degree of feeling is favorable to intellectual activity.

One who is very angry, very enthusiastic or very much frightened does not use his intellect effectively. On the

other hand, one whose feelings are not aroused shows little intellectual activity in planning to get justice, avoid danger, or to realize his ideals.

IV. Moderate stimuli and activities of all kinds are generally more pleasurable than very slight or very excessive ones.

V. Successful activity gives a feeling of pleasure and unsuccessful activity a feeling of dissatisfaction.

Children are usually fondest of the subjects in which they do the best and enjoy every success that is not too easily obtained. A reporter once told this story of Paderewski during one of his visits to Boston: "I stood in the corridor of the hotel in which Paderewski had his rooms and heard him play one little phrase of music over fifty times. I wondered that he spent so much of his valuable time on such a fragment of a composition. I asked him why he did so, for to my ears he had not changed it the fiftieth time, but he replied, 'It would have been impossible for me to go on with my day's work if I had not played that bit to my own satisfaction.'"

VI. A sound, touch, taste or smell may be enjoyed when of a moderate degree of intensity and greatly disliked when excessive, while a very slight stimulus is also unsatisfactory. Moderate physical and mental exertion is much more pleasurable than that which is very slight or excessive.

VII. The same stimuli and the same acts do not continue to produce the same feelings.

The song that at first delights us may become very wearisome if heard day after day and we should tire of any kind of food, no matter how delicious we thought it at first, if compelled to eat it too frequently. On the other hand, things which in the beginning seemed very disagreeable may, after a while, give us pleasure. The same holds true of

activities and occupations of various kinds. Frequent repetition without change usually results in relative indifference or lack of feeling regarding that stimulus or activity. On the other hand, if there is the right sort of variety in the character of the stimulus or activity, feeling may become more intense, as when musical enjoyment is increased by many hearings of various kinds of music, or love of mathematics is developed through solving different problems.

#### CULTIVATION OF FEELING

Every day our feelings are being aroused or controlled. Their modification is a gradual process effected by such daily experience. If the more desirable ones are cultivated they become a source of satisfaction and benefit to ourselves and others. Happy is the person in whom cheerfulness is natural, but double credit is due to him who cultivates this feeling. One of two elderly gentlemen is so disabled that he cannot walk and is nearly blind. The other suffers from rheumatism. Ask the former how he is and he will answer you, "I'm first rate!" Ask the latter and he will say, "I never felt meaner." Is it not desirable for the second to cultivate the optimistic feeling of the first, so that he, too, may be loved by his fellow men, and would not he himself find much more in life than he does at present?

Personally, do you admire the one who closes the shutters and complains about the darkness, or the one who opens them wide to let the sunshine fill the room? The feeling of cheerfulness, happiness, or optimism is greatly to be desired. This applies more to adults because the feeling of happiness is natural to most children.

By cultivating desirable feelings unpleasant ones are banished. Feelings which should be overcome are hate, revenge, selfishness, jealousy, conceit, etc.

Feelings to be cultivated are those of goodwill, sympathy, kindness, equality, love, determination, responsibility, satisfaction, patriotism, love for music, and all feelings which will inspire to high ideals those who nurture them.

Cultivation of feelings involves a systematic use of various factors in changing the feelings of one's self or of another person. Association with others, environment, necessity, imitation, repetition, and variety of stimuli are the important factors in the development of feeling.

The following story was told by a former student: "When I first came to normal school I was homesick and lonesome. I did not like the studies and began to dislike the school. However, I chanced to become acquainted with several girls who became my dearest friends. I now look back on my life at normal school as a very happy one."

One should always nurture the feeling of kindness so that it may become second nature.

Equality, the feeling that one person is just as good as another but no better, should be taught to children even in the lower grades. A child is often unkind to one less fortunate than himself in intellect and finances.

There was a poor, foolish boy in the school. In the lower grades the children laughed at him and made fun of him. As they grew older pity took the uppermost place in their feelings until finally the pupils not only pitied but loved their classmate. This feeling of love was doubtless developed in the home of one of the children. He loved the boy and the others came to do so. This also shows that feelings may be cultivated by imitation.

Surroundings or environment may tend to cultivate æsthetic feeling. A student who attends a school or college noted for beauty of location as well as for fine educational advantages cannot help becoming æsthetically developed. A

young person living in a slum district, debarred from even speaking with an educated person, hearing and repeating the thoughts of degraded humanity, cannot possibly develop the finer tastes and feelings.

A person who becomes reduced to poverty is likely to develop crabbed, disagreeable, and unpleasant feelings. If the same person could be transferred from his straightened circumstances so that he might enjoy some of the comforts which wealth can bestow, he might become a valuable social unit, inspired by feelings of love and generosity.

Disagreeable surroundings often mean undesirable feelings; agreeable surroundings generally mean feelings of contentment. Imagine a person working in a factory with all its noise and commotion on a hot day in July. In place of the factory substitute a comfortable spot on an ivy-covered porch. Instead of confusion there is quietness. In such contrasting surroundings this truth regarding feeling would soon be realized.

Is it possible to cultivate in children the love of school and of studies connected with that institution? The following incident illustrates one of the many possible methods by which love of a certain subject may be cultivated: A student in high school taking algebra failed completely the first year. This, he said, was due to the fact that the teacher did not take any interest in him. Naturally he did not care for his teacher and would not ask for help. The subject became uninteresting, and the result was a failure. The second year the pupil took algebra again, but he was placed under another teacher who appealed to him. He loved this teacher and was willing to do anything which would merit his praise and commendation. The result was that the boy studied into the early morning hours, mastered his subject, and ever after said that his favorite study was algebra.

Love of study may be cultivated also by removing obstacles which prevent children from doing their best. For example, too hot a room or one that is too cold will keep a child from entering into the spirit of the work. The physical condition of children has much to do with their attitude toward school; common conditions which are unfavorable are defects of the ear and eye.

Love for attending school may be cultivated by making the work interesting and pleasant. Arouse an interest in the pupils by showing them the necessity for studying each lesson. For example, in number work the children may be shown the use of arithmetic in a store or when trading for one's self. Geography and history are correlated in the lower grades, and it may be shown that to know one subject it is essential to know and understand the other. Take the pupils on a trip occasionally (an imaginary one is nearly as good as a real one), and let the pupils play that they are the heroes and heroines of history and act and speak just as these great and honored people have really done. By allowing pupils to take part in something which touches real life they will be convinced that school is not a grind and that books are an aid in doing things.

Imitation plays an important part in the cultivation of feeling, especially in the case of children. By imitating others we imitate their feelings to a greater or less extent. The mountain feuds are still carried on. Children are brought up like their parents and thus experience and imitate the feelings of revenge that their ancestors experienced.

By repetition tasks may become agreeable. The following example was given by one girl. "I used to dislike sewing very much, but through the persistent guidance of my mother it did not seem as hard and my sewing looked better. Now that I have learned to sew there is no disagreeable

feeling connected with it; indeed, I enjoy it." By persistent effort feelings of dislike give way to feelings of pleasure.

Changes in stimuli are necessary in the cultivation of feeling. The best possible drill for use in the schoolroom, if used too frequently, will fail to arouse the feeling of interest and result in dislike of the subject.

#### SUMMARY

Life in its truest sense would be impossible without feeling. It is the motive of all our action and is a phase of all consciousness. Often the element of feeling is stronger than knowledge and will power combined. However, feeling is not usually considered the aim of life.

Feelings vary widely and because of their great number we classify them so that we may talk about them intelligently. The classification used most in this pamphlet includes the following divisions: instinctive, organic, sensory, and ideational feelings.

Feelings may arise from four sources:—Senses, instincts, organic processes and mental processes. A sensory feeling is any feeling arising from the six senses. Instinctive feelings are those which accompany acts we perform naturally and involuntarily. Organic feelings are those arising from the condition of the vital organs and the processes taking place therein. Out of simple feelings rise the complex feelings accompanying mental processes, such as imagination and association of ideas.

The six senses vary as to the amount and intensity of the feeling they produce as well as in the extent to which they are used for purposes of gaining knowledge.

Senses which give the most intense feeling, like taste and smell, are little used for getting knowledge.

Physiological processes or organic sensations are sources

of very strong feelings. Examples of these are:—Thirst, hunger, fatigue, etc. Our general health is affected by physiological processes, as are also to a certain extent our moods and dispositions.

Instinct is hereditary and causes us to act involuntarily and without any definite end in view. Some of the most important instinctive feelings are:—Love, hate, anger, fear, sympathy, self-protection and curiosity. Of these, fear is most frequently aroused.

Ideational feelings are caused from our imagination, memory, recollection, and other thought processes. Their intensity depends upon the recency and kind of associated ideas, the clearness of the images and the activity of the thought processes.

The laws of feeling are:—1. Feeling and physiological processes are correlated. 2. Change produces more intense feeling. The degree of stimulus affects feeling and a rapid change in the former produces an increase in feeling. When our minds are active in a moderate degree only, our feelings increase and decrease as our mental activity increases and decreases. But when our mind is working at its maximum capacity, our feelings decrease as the activities of the brain increase, unless the mental action is along the line of our feelings, when they increase also. Successful activity gives a feeling of pleasure, and unsuccessful, a feeling of dissatisfaction.

The control of feeling is very important and may temporarily be accomplished by four means, namely,—control of the muscles, change of conditions of environment, change of thought and of act. A union of the four methods of temporarily controlling feeling leads to permanent control.

It has been found that we may cultivate our feelings by imitation, repetition, variety of stimulus, duty or necessity,



associations, and environment. We should strive to cultivate feelings which will benefit us and those with whom we come in contact.

## VIII

### A STUDY OF WILL

#### IMPORTANCE OF WILL

VICTOR HUGO has said, "People do not lack strength; they lack will." Without will a man can never expect to rise to a place of power, honor, or respect. Will is the center of personality.

In the seemingly unimportant routine of everyday life our will is constantly in use. Upon waking in the morning we use it in deciding whether we shall get up or lie a few minutes longer, what we shall wear and whether we shall partake of certain foods. It determines the degree of attention we give to recitations during the day, the amount of effort we put into the preparation of our next day's work, and into the breaking of undesirable habits, the observance of rules in the dormitory, and so on throughout each day.

A person utterly devoid of will could not even make and carry out his own decisions. There is no phase of life's work which does not require will power. What we get out of life depends upon what we put into it and the latter depends upon the use of will. The boy who goes into the race, or the girl who does her studying, *determined* to succeed, is the one who will win.

The drunkard is a failure in life because he lacks will power. Oftentimes he does not will to drink but the craving for liquor is so great that his will is not strong enough to conquer the desire.

One often hears the expression, "Where there's a will there's a way," and this seems to be well illustrated by the following example: Among my classmates in high school, there were two girls, Ruth and Myrtle, who intended to go to college. Myrtle's people were poor and could not afford to give her further education. Myrtle, however, was determined to go to college and secured a position. She worked hard and deprived herself of pleasures for which she longed. She realized, however, the importance of a college education and worked steadily on.

Ruth's people were wealthy and could easily afford to send her to college, although Ruth cared more for dances, parties, and entertainments than she did for study. The result was that she failed in her examinations. Ruth tried to study during the summer but, just as before, pleasure came first. Again she failed to pass the examination and was unable to enter the college. On the other hand, Myrtle, who sacrificed pleasure for work, reached the goal and proved to be a great success in the educational world.

We see, then, that what people become is determined more by their will than by their environment. Without will the course of our thoughts, words, actions, even our lives, follows the lines of least resistance and we accomplish nothing worth while. Whether our lives are worthy or not depends upon the amount and kind of control we exercise. Preyer has truthfully said, "A man's will shapes his destiny and forms his character."

#### NATURE OF WILL

Just what is will? Is it a separate, distinct factor regulating thought and action, or is it the culmination of all the forces operating at any one time in the human organism? Good psychologists take opposite stands. We, however, are concerned with will only as it is connected with our acts.

Let us therefore consider will as the function of regulating thought and action and proceed to analyze some of our so-called willed acts.

There are many acts which involve will to the extent of consciousness before doing, yet they are not *complete* acts of will. For instance, consider the following example: A mother saw her child at the extreme edge of a dilapidated and abandoned wharf. At once she rushed forward to save him from the impending danger. This act did not require thought, such as, "Shall I save my child from death?" or decision, such as, "Yes, for he is a good boy and has his father's eyes." The child in danger served as a stimulus, and the mother, only conscious of her aim to save her child, rushed toward him. Because the mother had an end in view, because she was conscious of that end before the action took place, will, to the extent of consciousness before doing, was involved.

Now let us consider another example: H. N. had wished since childhood to be graduated from Vassar College. As she grew older her sole aim in life was to write books, and as college seemed necessary for this, her desire developed amazingly until she believed that she *must* attend college. She lived with her father, mother, and young sister in a small manufacturing town. Her family could not afford to send her, although they were able to assist her in her efforts. One day an eccentric maiden lady, a friend of the family who had taken a fancy to H. N., offered to adopt and educate the girl. College! All its advantages and fascinations danced before her eyes. Could she accept? She must accept! Then came a period of serious thought. Should she choose adoption and subsequent education, or would she remain a daughter to her own father and mother and truly enjoy her education by working for it? She weighed the ad-

vantages and disadvantages. Finally she decided upon the latter course.

Here we have the factors which make a complete act of will. When H. N. was only a child she had a great desire to go to Vassar. As she grew the desire grew with her. By the time that she received the offer of adoption, this longing had increased immensely until it seemed that it simply could not be stifled. One factor in this case, then, was desire. H. N. had a motive also in wishing to go to college. She aimed to write books and this motive prompted the desire to be adopted and receive her education without drudgery on her part. Because she had a definite aim, consciousness before doing was also involved. After H. N. received the offer of adoption, the conflict between the broad and pleasant highway of ease and the steep and rocky path of labor required deliberation of the best type. Then the ultimate result of the deliberation and conflict was a decision.

Complete acts of will may be classified according to the degree of deliberation involved. That is, by increasing the amount of consciousness before doing, we have a higher type of deliberative act. The longer the period of consideration and the greater the number of ideas involved, the higher is the type of volition.

The question of which dress I shall wear requires little thought; whether I shall prepare my lesson or play off that tennis match requires some deliberation; which coat I shall buy requires still more. H. N.'s decision required careful weighing of advantages and disadvantages, while a decision of guilty or not guilty regarding a man who is being tried for murder requires the most deliberation of all.

Summarizing, we see that complete acts of will involve desire, motive, conflicting ideas, deliberation, and decision as well as consciousness before doing; also that they may be

classified according to the degree of deliberation; that is, the greater the consciousness before doing and the greater the number of conflicting ideas, the higher the type of volition.

#### CONTROL OF MOVEMENT

Many reflex and instinctive movements accomplish definite ends. Every voluntary movement must have a purpose. The muscular and nervous mechanism is in part the same, whether a motion is voluntary or involuntary. In the case of voluntary movements the primary results are usually foreseen, while this is not true of involuntary movements.

The child comes into the world with reflex and instinctive tendencies to special and to general movements. This is shown when a light is thrown upon a child's eyes and the general movement of contraction follows.

In spite of the fact that the child possesses mechanisms for obtaining many ends he does not know how to use them. If a bright colored ball is held before a young child the color attracts his attention and he reaches for it. He may miss it at first but eventually he succeeds in grasping it, learning by the trial and success method.

In many cases a child sees others doing something he wants to do, and by observing and imitating them his movements become like theirs. For example, a baby girl about a year old saw her big cousin pat the dog. As soon as the dog came near the baby she put out her hand and touched him. After several attempts she succeeded in patting him.

Conscious knowledge of the exact movements involved in acts is of less importance than is usually thought. Psychologists agree that there is little or no consciousness in familiar acts, such as walking and writing, but that we are conscious of many of the details while we are learning the movements.

• In obtaining voluntary control of any part of the body, various non-voluntary movements are performed and repeated until they are developed into voluntary acts. These movements are at first preceded by response to the stimulus of some object. A baby lying on a couch hits her hand against the curtain cord, grasps it, shakes it back and forth several times, and at last succeeds in pulling it voluntarily.

The tendency to move one foot forward when the other touches the floor results in the act of walking, when these reflex elements can be properly combined. Part of the mechanism of walking is in working order at an early age. The following example shows that the whole mechanism may be developed and its parts connected, without experience, and that consciousness often hinders rather than helps.

A child thirteen months old was sitting in his sister's lap. His brother across the room held out the baby's doll invitingly. He spied it and, quick as a flash, slipped from his sister's knees and walked across the room to receive his doll. This stimulus resulted in the child's first steps taken alone. He could not be induced to walk again for several days even when a similar stimulus was offered.

Thus we see that a child, in the beginning, has the undeveloped mechanisms with which to make voluntary and involuntary movements. Babies and animals learn almost wholly by the "trial and success" method, children by imitation, and adults, to a large degree, by comprehension.

#### THE CONTROL OF SENSATIONS

The sensations of the body are of vast importance and are an essential part of the human life; hence their control is very necessary.

The chief organs of sense are the eye, ear, nose, tongue, and skin. The sensations received from these organs, al-

though very important to us, are sometimes unpleasant. In order to adapt these sensations to fit our needs we learn to control them either by physical or by mental means, each of us perhaps employing a different method. Some people, especially children, exercise very little control over the sense organs; hence their life is made by their environment.

In infancy the movements which seem to indicate control are purely reflex. For instance, if the foot or hand is painfully or unpleasantly stimulated the infant will withdraw it. If a disagreeable object is in his mouth he will push it out with his tongue. These movements are not voluntary. After about three months he shows some control over the sensations he receives by using the sense organs in order to receive or avoid sensations. For instance, he turns his head directly toward the source of a sound; he turns his eyes and follows a moving object; or he moves his hands or lips to get pleasant sensations. From this time on he acquires more control in many ways. He burns his finger on the stove and learns by feeling that it hurts. The next time his hand comes near the stove he remembers the past experience and withdraws his hand instead of touching the dangerous object.

A child is fond of candy. One day he sees his mother putting away woolen clothes with something that looks to him like candy. He is told that he is mistaken, but in childish doubt he takes a piece and tries to eat it. Finding that it has a very disagreeable taste, which he has never associated with candy, he drops it, thus ridding himself of the unpleasant sensation.

The easiest way to control the sensations is by the removal of the stimulus. A class in psychology wishes to carry on the recitation but is greatly annoyed by another class which is talking and laughing outside the door. The noise is so great that the door has to be closed before the lesson can



continue. As soon as the stimulus is removed, however, the recitation goes on.

We have found from what has preceded that all the senses may be controlled in practically the same way. There is one method of controlling sensations by physical means which cannot be used with equal facility for all of the senses: this is control by movement of the sense organ itself.

The eye can be controlled in this way more easily than the other sense organs. For instance, one may avoid seeing a person if one so wishes, even if he is in the same room, either by closing the eyes or by moving the head so that they will be in a different position. At every movement the sensations of sight are thus determined by movements of the eyes.

Hearing is more difficult to control in this manner. If you are in a room where a piano is being played you cannot shut out the sensation by moving the sense organ. You can, however, get the sound more clearly by putting yourself in a favorable position or, by covering the ears, you can partially exclude it.

In a greater or lesser degree we can shut out or increase sensations of smell by slight movements, such as drawing the nostrils closer together or expanding them, breathing very slowly or very quickly, or turning the head from or toward the odor.

We find that gustatory movements are very useful to us in this way: A person had a piece of food in his mouth which seemed tasteless. By moving the tongue and pressing the food against the roof of his mouth, he gained greater sensations of taste and thereby knew what he was eating.

Tactile sensations are also affected in this manner. If you place your hand lightly on the surface of an object you cannot tell whether it is smooth or rough, but by rubbing back and forth or pressing more firmly on the surface, the

quality can be easily ascertained.

The finest touch sensations are received from the most movable parts of the body. For instance, a girl was lying on a couch with her eyes closed. A ball was placed on different parts of the body but only a sensation of cold was received. As soon as the ball was placed on her fingers she readily distinguished what the object was.

All of the sensations can be controlled to a certain extent by mental concentration. In the assembly hall I wish to listen to a lecture but there are several people talking back of me. I put myself in an attitude of attention and by special effort concentrate my mind on the lecture. I still get the auditory sensations from behind me, but to a lesser degree.

I am in a room where there is a very disagreeable odor. I must remain, however, so I close my nostrils as much as possible and give my attention to the person with whom I am conversing. By concentrating my mind on the conversation the intensity of the odor is lessened and in a short time I forget about it.

A girl is bird hunting. She sits down on a rock and soon notices a flutter in the branches overhead. At first she sees only the form of a bird and cannot distinguish the markings. By sitting there and giving all of her attention, however, she is able to see enough to classify the bird.

Thus we see that we can control our sensations in the following ways: by the removal of the stimulating cause, by movement of the sense organ, and by mental concentration.

#### CONTROL OF FEELING

Control of feeling is the power to restrain our inward emotions. All emotions deepen by repetition. If one allows an undesirable feeling to master him he should be on the watch to check that feeling on the occasion of a second mani-

festation. The man who falls into a rage, falls into a rage more easily the second time. He who keeps cool, under trying circumstances, will more easily control himself the next time. If a person forms the habit of being pleased with small things as well as great, joy may become his dominant emotion. Later, he will find it hard to become displeased with many occurrences at which another is constantly grumbling.

Any person can to a certain extent bring about a desired emotional change by summoning only those ideas which tend to inspire the desired emotions.

The following example shows one phase of this subject, the control of fear.

One cold winter evening a girl was in her home busily studying. The other members of the family were attending a concert and the girl had been alone for an hour or two. Her lessons finished, she leaned back in her chair with satisfaction. Upstairs a shutter banged, a stair in the hall creaked, and the girl was seized with an almost overpowering fear. It seemed as if she heard steps coming nearer and nearer, and she felt the impulse to scream. She picked up a magazine which lay on the table and read until her parents arrived. The fear which had almost overwhelmed her when she was alone now seemed groundless. Reading had served to turn her attention away from her terror.

Sadness is a feeling often in need of control. The following example was given by a student: There was once a girl who went away from home to attend a school in a distant city. After the excitement of arriving and settling, she began to be homesick. She braced up, however, and willed not to be conquered by her feelings. These she overcame by associating with other girls in the school.

Anger is also a feeling that is difficult to control. An

example is as follows: "One day a certain person said something to me which made me very angry. I did not answer for I willed not to say anything in return, knowing I would be sorry afterward. Knowledge of consequences helped me to carry out this act of will."

The control of laughter is also difficult, as the following shows: "Once when I was teaching a class of children I asked one of them a question which he answered in a very amusing way. The other children laughed and I really felt inclined to do so, but I willed not to yield to the impulse. My desire to show the children that I was there for business and not for play helped me to accomplish this end."

It is a very helpful though difficult thing to be able to control one's feelings. It is, however, essential that every teacher be able to control herself before she attempts to control others.

#### CONTROL OF MEMORY

Memory is, and always will be, one of the chief factors in education. For that reason we must learn how to control it that it may be of the greatest benefit to us.

One way of controlling memory is by the association of ideas. For example, a girl, in trying to recall facts heard at a lecture, imagines herself as again listening to the speaker and is able to recall the desired facts. Miss R. writes: "We have a friend whose name is Mr. Ash. Many times I have been unable to recall his name when I wished to use it, until I formed the habit of association. My mental process is similar to this: 'Coal, cinder, ash. Oh, yes! Mr. Ash.'" Control of memory by association is greatly increased by system, by noting similarities and by grouping many ideas under few heads.

One of the most effective methods of controlling memory is to appeal to the individual's special interest. A week has

elapsed since F. and A. attended one of Kreisler's musicales. F. recalls Kreisler, the man,—his personality above everything else. On the other hand, A., a true lover of music, retains chiefly the memory of his divine melodies.

Visualization is one of the most common means of fixing impressions and hence of controlling memory. Many students memorize selections by means of mental pictures. For instance: E. R., when repeating a poem, sees clearly the page on which the poem occurs and the arrangement of the stanzas.

Repetition is an important means of making other methods effective. Certain students who find it difficult to remember names form the habit of repeating a name several times and also saying to themselves, "I will remember this name."

Will or determination is an important factor in the control of memory. For instance, Mary writes, "I had been carrying the money for my class dues for months, thinking each day I must pay them but failing to think of it at the right time. Finally my mother said, 'You had better pay your dues or you will lose the money.' I made up my mind to do so and, determined not to forget my mother's advice, I did pay them."

Since memory determines the contents of our minds we need to control it or they may be filled with rubbish or with valuable material that we cannot find and use. As we have seen, some of the most common ways of controlling memory are: association of ideas, interest, visualization, repetition, and determination.

#### CONTROL OF MENTAL IMAGES

One of the best aids to memory is making mental images. In order to form a mental picture, it is almost always neces-

sary to exert will power. How dull and uninteresting life would be if we did not have control of our memory through the aid of mental images! The advantage of these is shown in the following example: If I visit a strange city or town for a day, I have a clear mental picture of the station, the main street, a few stores which evidently impressed me more than others, and the buildings or houses where I may have gone. If I am visiting a large city and walk with a friend between two places which are a distance apart, I am able, by means of mental images formed, to make the return trip alone.

Without control of our mental images, details of an incident like the following could not be reproduced. Several winters ago a large sawmill near my home was burned. The building, which was of wood, and the piles of dry lumber made a fire long to be remembered. I sat at our bay window, watching the flames and sparks shooting upward and the men hurrying down the street. I could see very plainly as the glare of the flames on the snow made the scene as light as day. In the first confusion, men made desperate efforts to extinguish the flames with water. Soon, however, they realized the futility of this and gathered in excited and gesticulating groups.

How much enjoyment the girl had who writes: "One evening last week I wished very much to attend a ball but could not do so. I sat down in an easy chair, however, and willed myself to picture the ballroom. I could see the dancers and even some of the dresses which I knew certain girls would wear. I could also hear the music, and really found pleasure in these images."

By the aid of images we get much pleasure in reading, conversing, and listening. "Just before the Christmas vacation, Miss K. read to us *The Mansion*, by Henry Van

Dyke. During the reading I had many visual images of the people described and the mansions belonging to them, which added greatly to my enjoyment of the story."

The imagination is an important factor in helping people to construct and carry out new ideas. Almost every advance in the present day world is the result of some person's imaginative powers. For example, take some wonderful new discovery in the medical world. People say it is the result of thought and experimentation, but let us see what is at the bottom. Is not this new discovery first the product of the imagination? The originator of the process sees far enough ahead, by means of mental images, to know the probable result of his experiment. He strives for certain ends, but, between the beginning and the final result, there is a large gap which must be bridged through mental pictures of each intervening step.

The inventor, also, makes use of his imagination. He is constantly willing a certain kind of image to come before his mind's eye. The first image he sees is that of the whole machine, then he sees each of the component parts. It is his will that directs his thought along the right lines.

When drawing our maps from memory in geography it is necessary to have a correct mental image in order to make a correct reproduction. An artist, in painting a portrait, must have good control over his mental images in order to reproduce the most minute details of his subject.

The success of a public speaker depends upon his ability in getting his audience interested, by giving descriptions and relating stories. He must tell what occurred so clearly that his audience will be able to picture each scene of which he speaks.

One student writes: "After a heavy northeaster on the Maine coast, my brother and I visited a certain island, eight

miles from the mainland, to see the surf. The sun shone gloriously, making the narrow plank walks gleam white, as they wound through the bayberry and sweet fern to the south shore of the island. We stood on a narrow platform over the ocean and even now I can feel the wind on my face and taste the salt spray. When we reached the rocky shore, many people were scattered about, and even the most rotund looked frail and helpless against the mountains of green water with snowy crests that pounded on the rocks."

From the above one may readily see that the most important uses of mental images are as follows: to help us remember certain places or definite details, to give pleasure in reading, conversing, and listening, and to help us to construct and carry out new ideas. By controlling our images we make our mental life what we wish it to be.

#### THE MAKING AND CARRYING OUT OF DECISIONS

The term will involves the conscious choosing of an idea or course of action out of a great number of possible ideas or courses, and a steady adherence to the one chosen. Much of our conduct is governed by simple habits. It is only in new and complex situations that the process of willing becomes distinct. Then we find two sources of difficulty, one in ascertaining what to choose, the other in abiding by our decision.

Let us consider the following cases: A young man, the son of wealthy parents, had, as a matter of course, entered college. He was well established in his freshman year when his father's business failed and the family was left in comparative poverty. "I will get my education just the same," he thought, "and after I graduate I will retrieve my father's business," which he did. Thus we see that ambition may aid in the making and carrying out of decisions.



In contrast, consider the case of another young man also left in poverty during his college course. He decided to sell books during the summer to help cover his expenses. At the close of the term, however, he was invited on a yachting cruise with his chum. He accepted the invitation and lost his opportunity for earning the money to cover his expenses for the next year. Here we see that desire for pleasure may hinder the carrying out of decisions.

Johnnie, a spoiled child in a rural school in W., was much given to throwing paper about the room. One rainy morning when he had been very naughty his teacher said, "Now, Johnnie, if I see you throw any more paper this week, I shall punish you severely Friday night. Do you understand?" "Yes'm," said Johnnie, meekly. He thought, however, "Friday night — she will forget before then." And she did.

The next week Johnnie began his pranks again. Just as the first wad of paper sailed across the room the teacher called out, "Johnnie, if you throw another piece of paper, I shall punish you *at once*." Johnnie slid down in his seat, a frightened and submissive boy, deciding then and there to be good. His decision was carried out. This example shows that if the punishment or reward is to come at once our decisions are made and carried out much more easily than if it is to come at some future time.

Mary, a little girl in the sixth grade, was inclined to be lazy. One day her teacher scolded her sharply for a failure in arithmetic. The next day the work showed no improvement and Mary seemed very much discouraged. The teacher said, "Where there's a will, there's a way." The child did not seem to appreciate this and after a time her teacher resolved to make another attempt to encourage her. When the opportunity came she said, "If at first you don't succeed, try, try again." Then Mary resolved to "try, try

again." In the following weeks her work showed decided improvement. This shows that proverbs sometimes aid the making and carrying out of decisions.

We often find opposite influences working one against the other. Consider the following: "A boy living in a large city had learned the bad habits of smoking, swearing, and drinking. He became acquainted with a young man from the Y. M. C. A. whose good opinion he valued highly. This induced him to decide to give up his bad habits. One afternoon his former associates persuaded him to join them in an attempt to rob a house that evening. Much persuasion was needed but he finally yielded. While on his way to the place of meeting he remembered his friend at the Y. M. C. A. and the good opinion which he knew he would lose should his lawlessness be discovered. Consequently one member of the gang was absent that night." In this case persuasion aided the making of the decision, but desire for the good opinion of another hindered the carrying out of that decision and aided the formation of a new one.

The following is another example: "The members of a boys' club had just finished reading the poem 'One Niche the Highest.' All of them with the exception of one had succeeded in carving their initials on a high ledge in the neighborhood. This boy, however, accomplished it one Saturday. The next week he decided to carve his initials still higher. After climbing up several feet beyond his first inscription he looked down and was overcome with fear. Several times he attempted to climb higher but was forced to yield to his fear and return to the ground. In this example, pride aided the making of the decision while fear hindered its carrying out.

Habit has, perhaps, the greatest influence on the making and carrying out of decisions. If in childhood we form the

habit of making wise resolves and living up to them we will usually continue to do this in later life. On the other hand, if in the habit-forming period we follow the lines of least resistance we will never be able to make and carry out our decisions without great effort. It is essential, then, that teachers train their children to form good habits.

Thus we see that there are many things which influence the making and carrying out of decisions. We have also seen that there may be several opposite influences working against each other. Some of the things which influence the making and carrying out of resolves are duty, nearness of the time of punishment or reward, proverbs, suggestion, feelings, such as pride and fear, persuasion, the good opinion of others, and habit.

#### STRENGTH OF WILL

Strength of will is *the* important factor in the carrying out of decisions. Since will is the power that controls our actions, a strong will is one which allows nothing to interfere with the accomplishment of a definite end *unless* that end or course of action is proved unwise. Under the subject of strong will may be classed many of the essentials which make up the character of a person. We know character only by outward action. Since will controls action let us consider some of the elements of a strong will. They are choice of duty rather than pleasure, and of greater remote, rather than of small immediate advantages, deliberation before deciding, being guided by reason in choosing, and persistence in carrying out such decisions.

Examples of the first type are as follows: "A girl whose mother is ill is invited to go for an automobile ride. Resolved from childhood to be helpful in her home life, she recognizes the fact that there is much for her to do at home.

Although the prospects of a ride on so hot a day seem very attractive, yet realizing her duty, she remains at home."

"A man who occupies a high position has very strong views about certain questions. As a boy he determined to be honest and to lead an open, honorable life. He knows that by publishing his views broadcast he will be in danger of losing his position. He has a large family to support and no permanent income. For the sake of the truth in the matter, however, and to satisfy his sense of right he determines to publish his ideas. He does so and loses his position. This illustrates the fact that a truly strong will disregards unpleasant consequences when right is involved."

The following is given as an example of deliberative choice in carrying out a decision: "M. B. had been taught the lesson of economy in dress. She had, however, a natural liking for pretty clothes and accessories. One day she saw a pair of pumps in a shop window and she liked them exceedingly. It was near the end of the season and the price was temptingly reasonable but the question of practicability came up, as she had only a limited amount of money to spend. Would it be wiser to buy the pumps or to purchase a pair of high shoes? She wished the pumps but, after careful deliberation, bought the high shoes, knowing that they would be more serviceable."

A certain junior has the opportunity to leave normal school at the end of the year to teach in a colored school in the south. The question for her to decide is whether it would be to her advantage to return to normal school and receive her diploma or to accept the position which would afford her an immediate income. She sees that the former course will mean more to her in the end and therefore decides upon it. This is an instance of choosing between immediate and remote advantage, showing that more strength of will is re-

quired to decide upon the latter than the former.

A person with a weak will is one who cannot carry out his decisions, is readily influenced, and easily discouraged after having made a decision. Furthermore, he will be unable to surmount as many difficulties as one with a strong will and in the end will probably fail to carry out his purpose. Being influenced by others to refrain from acting in the way one knows to be right gradually weakens the will.

One night a high school girl had a theme to write. She sat down at her desk and had just written the title when a girl friend came in and asked her to go to the moving pictures. She knew that she ought to stay in and write the theme but when her friend repeated her invitation she consented to go. She knows and desires to do what is right. Being influenced to give in on one occasion, however, she will, no doubt, act in a similar way a second time.

The following example shows how a person with a weak will acts upon the desire of another: Grace and Alice are talking together and Grace expresses a desire to go to the park for the afternoon. Alice does not feel that she can afford the time but is easily persuaded by her friend to go. Alice is undecided what to wear until she questions Grace and follows her advice. Grace asks, "What time shall we start?" but Alice has no suggestions to offer. Grace, therefore, is obliged to take all the responsibility. Alice is a typical example of the weak-willed girl who does not rely upon herself at all.

There is still one more type of will to be discussed and that is obstinacy. An obstinate person is one who is stubborn, headstrong, unyielding to reason, arguments, or persuasion. The old saying, "There are none so blind as those who will not see," is very true, for an obstinate person refuses to listen to reason or to see things from any point of view but

his own. The following is an example of this: There is a man in a certain town who decided to go to San Francisco solely on a pleasure trip. Many things totally unforeseen when he made his decision have come up that would keep the ordinary person at home. His daughter suffered a long illness and the condition of his business was anything but satisfactory. Duty to his family and unceasing endeavor to better his business condition did not appeal to this man. Having made his decision, he determined to carry it out regardless of the circumstances. On the other hand, a man of strong will would postpone his pleasure trip and carry out his deep-rooted ideal of unselfish devotion to his family. This shows that obstinacy and strong will are not the same but two distinct qualities.

We may repeat, then, that the essential elements of a strong will are, choice of duty rather than pleasure and of greater remote rather than lesser present advantages, deliberation in choice, disregard for unpleasant consequences and persistency in reasonable action.

#### FREEDOM OF WILL

Freedom of will is shown in judging in accordance with reason and so as to realize to the greatest extent one's desires. All men are created with the possibility of a free will. Because a free will is an achievement and not a gift, each man's will develops differently, either growing more free or becoming more susceptible to outside influences.

One of the students wrote: "One evening I attended a lecture on 'Europe and the War of Today.' The audience was composed of people of different nationalities, all of whom seemed vitally interested in the subject. Many gave outward signs, showing their sympathy with one side or the other. I tried to live up to my ideal of justice by not sympathizing

with either side until I had heard both views on the subject. Consequently I was more free in forming my opinion than those who had been influenced by their emotions." In this case adherence to ideals promoted freedom of will.

Luther Burbank has greater freedom of will in the plant world than any other person because he thoroughly understands plants and knows how to deal with them. A man who wished a row of rapidly growing shade trees purchased the variety which he, with his smaller amount of knowledge, considered best. He carefully followed the directions which came with the trees and was obliged to wait the usual number of years for them to grow. On the other hand, it is said that Luther Burbank, by using his knowledge of trees, grew a chestnut tree in half of the usual time required for growth. From this we see that the person who has the broadest knowledge of how to obtain desired results is the person who has the freest will.

The question may be asked which person is more free, the person who has one aim in life or the person who has a great many. For example, Helen and Alice were very fond of music and both of them had considerable ability along that line. Helen, however, studied music but a short time. Then she took up physical culture and later she studied domestic science. In the meantime Alice was diligently studying music. Three years later the position of music instructor in a certain city was vacant. Both of the girls applied for it but Alice received the position because Helen was "Jack of all trades and master of none." Alice realized her desire and became proficient in music, while Helen, her interest divided by many different aims, did not realize any one of them.

We see, therefore, that a broad aim or group of consistent aims helps to form a free will, while aims along different lines and those which are opposed to each other hinder freedom

in willing. Other things which help to develop a free will are adherence to ideals, a non-prejudiced condition of mind and broad knowledge.

#### TRAINING THE WILL

As we have seen, the ideal will is that power which directs us into right lines of action and holds us to our best in the accomplishment of some dominant purpose. Training the will is training the man. How this is best done we shall consider briefly.

First, there is obedience to parents and superiors. There are two courses usually pursued, one as harmful as the other when carried to extremes. The one demands a formal, unhesitating obedience: the other requires no obedience, but allows the child to be governed by his own caprices and humor.

With children under twelve years of age, if one or the other method is used exclusively, the former is the better; first, because the child brought up without the idea of obedience is unfortunate, and second, because there are certain great laws which must be obeyed. Most children, however, when rightly trained, can be made obedient without force. Allow them to choose whenever possible. There are many devices which will aid in leading a child to do the right thing voluntarily. Give him a choice, such as, "You may pick up your toys or go without them to-morrow." Here a certain amount of freedom is given and a certain amount of obedience exacted.

Another device is having a regular time for the performance of duties and for play. The child who knows that he must go to bed at eight o'clock is not apt to demur when the time comes. On the other hand, the child who is sent to bed at seven one night and eight the next is very apt to feel that bedtime is a whim on the mother's part.



As the child grows older and passes the period when impulses are so strong and rationality so feeble, he should be given more freedom in choosing and making decisions, for the will does not begin to grow until definite choice is made. Power to choose the right comes more easily to him who has chosen the right many times.

Consider the case of a teacher who was asked by a little boy of six and another of fourteen, on a cold winter day, if they might go tobogganing. To the younger child she said "No," but explained why she could not allow him to go. To the older boy she gave the right to choose, after warning him of the extreme cold. He chose to go and returned with both ears frozen. The next day, when a similar choice was offered him, he knew which course was the wiser for him to pursue.

Another example, showing the value of decisions, is as follows: Two fathers were confronted by the problem of their sons keeping late hours. The first father made a rule that his son should be in at nine o'clock. The son's instinct of freedom rebelled at this, and he very soon began to practice various deceptions which resulted in his leaving home.

The other father, after talking the matter over with his son, decided that the boy should have a key of his own and keep his own hours. After a few nights of late hours and loss of sleep, he began to realize his physical fatigue and mental strain, and, feeling free to do as he liked, he chose to keep earlier hours.

After a decision has been made it should be carried out unless, in reconsidering, it is found to be a wrong one. Every unexecuted decision weakens the will. For example, a boy after sufficient reflection gives his word that he will help another boy with his algebra. Then he receives an invitation to a ball game. He wavers between duty and pleasure and

decides to go to the game. His mother, hearing of it, reminds him of the value of keeping his word and the boy is so impressed that he carries out his first decision. In the future, when similar decisions are to be made, he will be better able to stick to his word for having done so that once.

The formation of habits helps in will training. A boy who has formed regular habits of study or play will be less tempted to neglect his occupations during the appointed hours.

Oftentimes the will is trained by habits that at first were not agreeable. For example, a child who at first disliked to wipe dishes soon began to take a pride and pleasure in the neat performance of this task, as it became more and more of a habit.

The formation of habits is very closely connected with imitation, our next factor in will training. Children are imitators. In the schoolroom, then, that is an important point to be considered. If the teacher tries to train her pupils in forming good habits she herself must first be punctual, polite, careful in speech, just and charitable, and practice all the virtues which she wishes her children to cultivate. Children will seldom excel the standard set at school and the same is true of the home influence in habit forming.

Control of attention, memory, and imagination help toward will training. The boy who can be sufficiently interested to concentrate or give attention for a prolonged period is getting valuable training in will development. This may be done by competition, rewards and other artificial means. The best way, however, is to create a desire to do the task because of satisfaction in the accomplishment of a duty. Control of imagination may be gained in the schoolroom by reading literature or listening to stories that will direct in the right way. Memory may be trained by repeating stories

told or read, and by memorizing fine passages of poetry or prose.

The control of transitory emotions helps to train the will. Parents and teachers can do much toward this end by never allowing their own emotions to become uncontrollable. If we are striving toward an ideal this can be done more easily. For example, if, on a ball field, a player has occasion to give vent to anger, the knowledge that his success depends on his coolness helps him to control the outburst. Many little devices such as bodily stiffness, relaxation, calm carriage, and facial expression, help in controlling emotions.

Play is another factor in will training. In this a boy acquires the ability to decide quickly, to control his emotions, and, above all, to maintain the spirit of fair play or justice to his comrades.

Another factor to be considered is obedience to civil laws. When an individual is led to conform to certain standards of conduct or action, whether agreeable to himself or not, he is training his will.

Many acts may be planned with reference to the future and the will can be trained in this way. For instance, the schoolgirl who considers her studying as a means to an end, works in the way that will aid her most in her profession and thereby gets more will training than she who prepares each day's work as if it were for that day alone.

Sacrifice or self-denial is valuable in the attainment of will power. This can be practiced in the schoolroom, on the play ground, and in the home. A teacher or mother who can make a child feel that he ought to sacrifice a little pleasure in giving another child his place in a game or in giving up some delicacy from his lunch basket to one who has not fared so well, has done not a little toward training his will. On the contrary, a girl who has not sufficient strength of mind to

refuse an invitation for an automobile ride when she knows it to be her duty to stay at home and write a paper, has not made much progress toward force of character.

The most powerful factor in will training is ideals. They are necessary to a strong will, because without them we should follow every impulse. Ideals are determined by the society in which a child is brought up. If a boy or girl finds that his parents or associates disapprove of certain acts and approve of others, he takes their approval for law. Their ideals become his.

Development of ideals can be accomplished only indirectly. The greatest influence is a proper social atmosphere where one is in contact with people who live according to high standards. Give the child the best in literature, music, and art. Well-told stories are powerful instruments in the hands of a mother or teacher. Precepts and proverbs also put the truth vividly before children. The celebration of such days as Washington's Birthday, Memorial Day, and other days which commemorate the great heroes of a nation should be encouraged. The ideal should be kept constantly before children and they, like the boy Ernest who had the image of the Great Stone Face always before him until he himself resembled it, will gradually embody it.

If we keep ideals before us, they will be the guides of our habits, emotions, self-denials, obedience, decisions, and other means which we have discussed, until we acquire the ideal will — that which, beginning with the direction of our simplest movements, finally governs our whole lives.

## APPENDIX

### SUGGESTIONS TO STUDENTS

#### *Habit*

IT will be a valuable experience for each student to make a definite and determined effort to break some old habit and form a new one. He will learn much from the experiment by keeping a diary of successes and failures, with all discoverable reasons for the same. In this study special attention should be given to the conditions under which habits are most likely to appear.

Besides this, it will be worth while to carry on some simple experiment in learning and habit formation. A substitution test may be used, such as making the corresponding forms instead of the figures as indicated in the following diagram.

1	4	7	1 will then = J
2	5	8	2 will then = J
3	6	9	5 will then = □
			and if $X = 0$ then $10 = \text{JX}$ , etc.

The experiment may be made by writing the numbers in order, using the forms instead of the figures and writing up to 20 each time. The number of seconds required to write the first time, the second time and so on should be recorded for ten series on two or more successive days. These records should be studied to see how much improvement in rate takes place, also whether it is greatest at first or later.

Next the question of how the time is shortened should be

considered. Is it due chiefly to more rapid movements or to changes in the way of working, such as ceasing to look at the diagram or looking at or thinking of one form while writing another?

The relation of former habits of thought and writing should be noted to discover what helps and what hinders. This and the special character of habits may be further studied by using this code in copying numbers and in working examples.

### Memory

The following experiments are similar to those given students and upon which their "results of tests" are based.

(1) A dozen or more small objects may be placed in a shallow box or on a table and disclosed to view for about twenty seconds. Each subject then writes a list of the objects. This will be the immediate *reproduction* list. Several days later each subject should write his *recall* list. The experimenter should then read a list of things in the box and the subjects write all that they recognize, the *recognition* list. The experimenter, without letting it be known, should have included in the list the names of several objects that were not in the box but might have been. Following this the experimenter should ask as to the color or other characteristics of objects that were in the box and also of some that were not, to see if any false memories will appear. The subjects should also observe *how* they remembered and the causes of errors if any occur.

(2) The effect of substituting description for actual perception may be tested by asking subjects to imagine what is in a box as its contents are described, then have the list reproduced and later recalled and recognized.

(3) The effects of familiarity and previous knowledge may be studied by giving successively the following letters,

nonsense syllables, words and sentences to be reproduced after one hearing. Explain the difference in the number of letters that can be reproduced in each case.

r	lev	bird	<i>Sentences</i>
y	dut	rug	The boy took the axe, called his
a	niv	ear	dog and went across the field to the
g	paz	slate	woods and chopped down three trees.
n	dib	cap	He cut them into cord wood and then
q	tol	door	he went home to supper.
b	ked	box	
m	feg	tree	
w	kip	corn	
c	ruz	axe	

(4) An experiment such as is mentioned in the text as the Rousseau test may be given by hearing a connected passage of a half page read and its essential thoughts reproduced, then at a later time recalled. At another time give for reproduction and recall fifteen unconnected words from the same passage.

(5) Have the following passages read, reproduced and later recalled, to discover which is easier and why.

The desk is 30 inches wide and five feet long. It is fifteen feet from the door, which is  $3\frac{1}{2}$  feet wide and three inches thick. The road is fifty yards distant and the postoffice one and a half miles.

The desk is sixty-five centimeters wide and two meters long. It is five meters to the door, which is one meter wide and seven centimeters thick. The road is forty meters distant, and the postoffice two kilometers.

### *Imagination*

No. 1. Notice what images are suggested by the following words, bell, orange, dog, piano, steak. In how many

cases are they visual? auditory? tactile? olfactory? gustatory? kinæsthetic, *i.e.*, of motion? Try mentally to see, taste, smell and touch an apple and to hear the sound of it dropping on the ground. In which case can you make the image most like the corresponding sensation?

No. 2. To test the extent to which images may be substituted for sensations and perceptions: (a) Think of a long word as it looks, count the letters and spell it backwards and note if you can do so as readily as if you were looking at the word. (b) Think of a bar of music as it sounds, count the notes and repeat backwards.

No. 3. To test your constructive imagination as a substitute for perception, imagine a three-inch cube, red on the outside and white inside, cut into inch cubes, and tell how many are all white, how many have one red side, how many have two red sides, how many have three?

No. 4. To test your creative imagination plan a new finish and furnishing for a room, or mentally choose and arrange the materials of a dress, or make a design for a rug.

### *Attention*

It will be a valuable exercise in determining what gives objects impressiveness or attention value to make a series of sheets upon which are colored papers or printed words. By varying in one respect at a time it will be possible to tell what color, what position, what size is most likely to attract attention and other changes may show the effects of contrast.

After this, advertisements may be studied to discover their effectiveness in getting attention and in directing it to the essentials, *viz.*, the nature of the article advertised and the name of the firm.

Speeches and literature may also be studied to see how attention is secured by sensory means or by appeal to the



imagination. The applications to teaching should then be reported.

### *Concepts*

(1) Define a list of words noticing the degree of definiteness of your concepts, then classify them as class or abstract.

(2) Describe some peculiar concepts of children and the ways in which they were changed.

(3) Make a list of inductions and deductions you have observed in the words or acts of yourself or companions.

(4) Plan one or more lessons showing how pupils may be aided in forming and using concepts.

### *Perception*

No student should study perception without experimenting. Too much space would be required to describe in detail a fraction of the interesting experiments that may be made. Any one with a little ingenuity, from the suggestions given in the text, can devise experiments for himself and others. Usually experiments may best be made by two persons, one acting as experimenter and the other as subject. It is generally best that the subject should not know the exact conditions of the experiment and he should observe as carefully as possible his mental states as he gives judgment. The experimenter on his part should carefully arrange to make the conditions of the experiment uniform and to have it planned so that he can accurately observe or measure the results.

### *Feeling*

(1) As a means of judging the comparative importance of sensations, physiological processes and imagination and thought in producing feeling, consider which you would pre-

fer: to be where all sensations of sight, sound, etc., were pleasant but with no interesting and agreeable thoughts, or to have pleasant thoughts in dreary surroundings; or to be well, regardless of ideas and sensations, or to be sick in most agreeable surroundings and with enjoyable thoughts.

(2) To judge of the importance of the various senses in producing feeling, consider to which you would attach most importance in choosing a boarding and rooming place, the prospect of pleasant or unpleasant tastes, sights, sounds, odors, or touch sensations.

(3) Make a complete outline of a plan for using your knowledge of what modifies feelings and the laws of their cultivation, in changing some feelings such as cheerfulness or despondency, good nature or irritability, love or dislike of literature, music, arithmetic, etc.

### *Will*

(1) Is it possible to get a person who ordinarily shows little will power to act vigorously and persistently by keeping before him a strong motive for so doing? Describe from your experience how this may best be done. Which is most necessary in a teacher, the ability to arouse strong desire to do or to be able to show clearly *how* to proceed?

(2) Give examples of how one may make himself see the things he wishes to see, imagine and remember what he chooses and think of what he desires to keep his mind upon.

(3) If doing a certain act would result in certain punishment equal to a day's imprisonment at once in one place, in two days' punishment a month later in another, or five days a year later in another place, in which place would the inhabitants be least likely to do the act? Discuss immediateness of results as a factor in choosing and in vigorous action.

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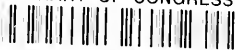
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